THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

[REGISTERED AS A NEWSPAPER.]

VOL. XXVIII. No. 691.] LONDON, AUGUST 8, 1876. [28TH YEAR.] Price 6d.

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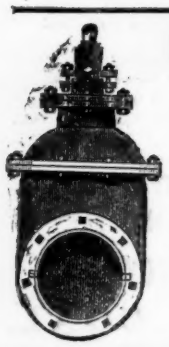
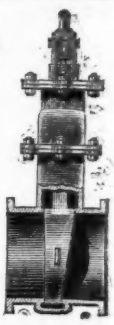


C. & W. WALKERS' DOUBLE-FACED GAS-VALVES.



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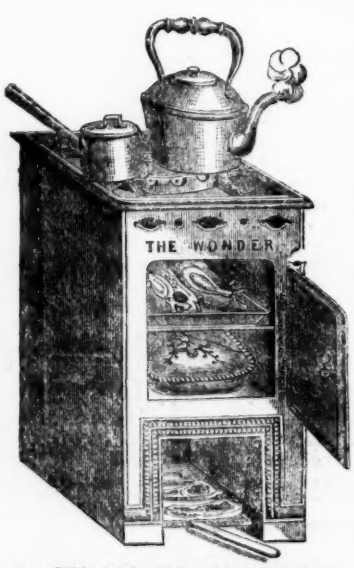

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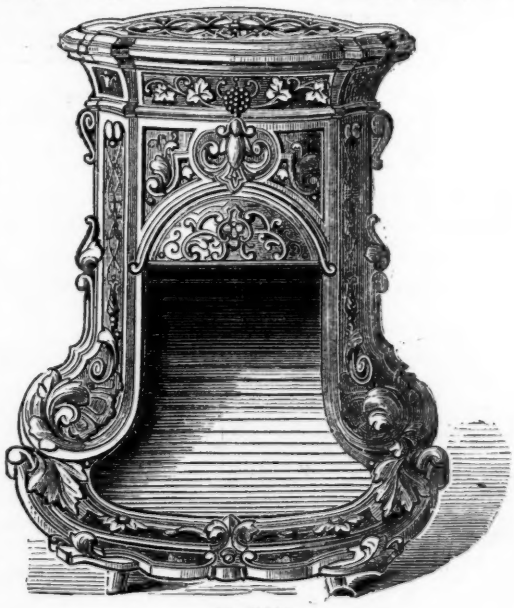

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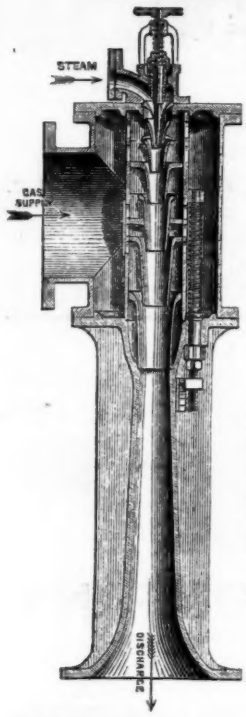

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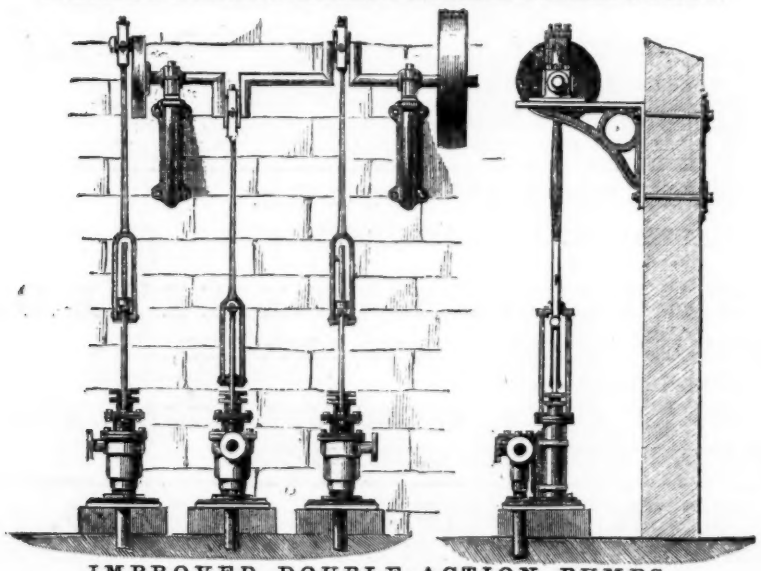

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INTERNATIONAL EXHIBITION, 1862.

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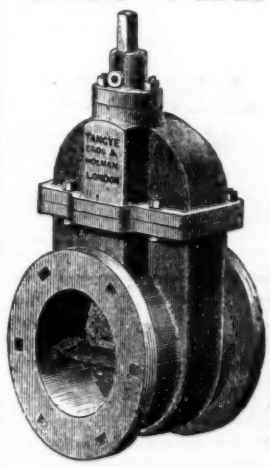

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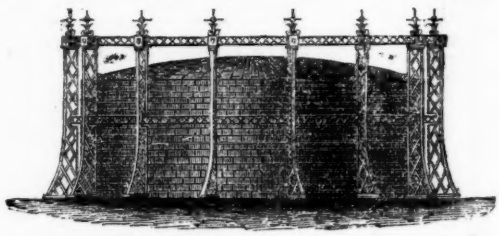

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A	B	C	D	E	A	B	C	D	E
41	19¾	7"	102	810	19	6"	5"	30	85
1	16"	5½	57⅞	400	17	6¾	3"	18	45
31	15"	5"	50½	330	18	6¾	2"	10¾	30
3	14"	5½	60	325	20	5½	2"	10 1/2	22½
4	13"	6"	54	300	35	5½	2¾	12½	30
5	12"	5¼	42	270	25	5"	4½	23	55
30	10"	5"	36	175⅓	22	5"	3"	13	30
8	10"	4½	32	130	36	4¾	2"	8	17½
32	9⅝	4½	29	116	40	4"	3"	11	20
9	9¼	3½	24 & 30	90	25	4"	2"	8½	14
33	8¾	2¾	18	60	37	3"	2"	5½	10
12	8"	4"	22	80	38	3"	3"	9	17½
11	8"	5"	29	95	A	No ON SECTION SHEET			
13	8"	2½	15	40	B	DEPTH IN INCHES			
39	7"	4"	22½	70	C	WIDTH OF FLANGE			
15	7"	3½	19	60	D	USUAL WEIGHT PER FT			
16	7"	2¼	14	35	E	CONSTANT.			

TO FIND SAFE DISTRIBUTED LOAD IN TONS DIVIDE THE CONSTANT BY THE SPAN IN FEET.

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MANUFACTURERS OF
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Of every size and shape, and of the best quality; also of White and Coloured GLAZED BRICKS, SANITARY PIPES, &c., &c.
In order to meet the constantly increasing demand for their Gas-Retorts, the F. I. Co. have recently made such an addition to their premises as will enable them to execute expeditiously the largest home or foreign orders.
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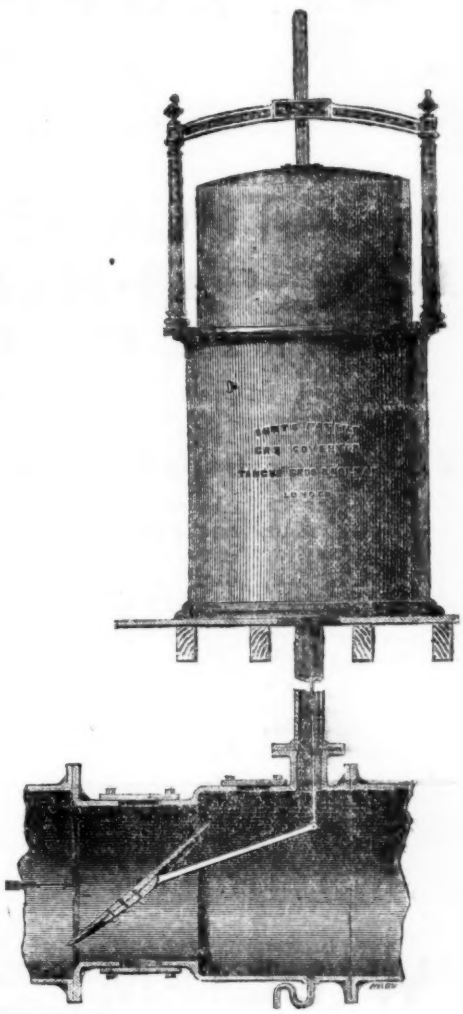
LAURENCE POUNTNEY LANE, LONDON, E.C.,

SOLE MAKERS OF

HUNT'S PATENT EQUILIBRIUM GAS GOVERNOR.



In this Governor a Throttle-Valve is substituted for the ordinary suspended Cone, all external communications being avoided by placing the Lever or Radius Arm (shown at C on the drawing) inside the Valve-Chamber upon the Disc. The Disc is carried upon steel centres, upon which it is accurately balanced and turns freely. The friction in working is thereby reduced to a minimum. This Governor is extremely sensitive to alterations of inlet or outlet pressure, and renders a large actuating holder unnecessary.

The principal advantages of this arrangement over the ordinary form of Governor are as follows:—

Its sensitive action prevents oscillation.

It is self-adjusting—*i.e.*, it maintains a steady pressure under variations of inlet pressure or a fluctuating consumption.

The inlet to Gasholder being contracted to the smallest possible dimensions, all danger from leakage through insufficiency of seal, tilting, &c., is entirely avoided.

The valve portion being separate from the holder, it can be handled and fixed like an ordinary Slide-Valve direct in the main; and the holder can be placed at any convenient distance immediately above it. The cost is thus materially reduced, and the inconvenience of heavy lifts done away with.

There are no working parts likely to get out of order.

These Governors have been adopted by several leading Gas Companies, among whom are the following:—

The Gaslight Co.—two 36 in. at Blackfriars.
" " a 36 in. at Goswell Road.
" " a 24 in. at "
" " a 24 in. at Whitechapel.
" " an 18 in. at Bow Common.
" " a 24 in. at Beckton.
" " a 6 in. at "
The London Gas Co.—a 24 in. at Nine Elms.
" " an 18 in. at "
" " an 8 in. at "

The Exeter Gas-Works—a 24 in.
" Abergavenny Gas-Works—a 10 in.
" Birmingham Gaslight Co.—an 8 in.
" Monmouth Gas-Works—an 8 in.
" Devonport Gas-Works—an 8 in.
" Cannes Gas-Works—an 8 in.
" Mentone Gas-Works—an 8 in.
" Rochdale Gas-Works—a 4 in.
" Imperial Gas Co., a 12 in at Great Cambridge Street.

TESTIMONIAL.

The Gaslight and Coke Company, 9, Water Street, New Bridge Street, Blackfriars, E.C., Feb. 27, 1875.

MESSRS. TANGYE BROTHERS AND HOLMAN.

Gentlemen,—The two 24-inch and three 36-inch Hunt's Equilibrium Governors supplied by you, and fixed in the valve-rooms at Whitechapel, Goswell Road, and Blackfriars, are working very satisfactorily.

Yours truly,

(Signed) JOHN JOHNSON.

VIENNA EXHIBITION, 1873.—The highest prize and only Medal "for Progress" for Direct-Acting Steam Pumps for general purposes was awarded to TANGYE BROTHERS AND HOLMAN, Engineers, London, for

THE "SPECIAL" DIRECT-ACTING STEAM PUMPS.

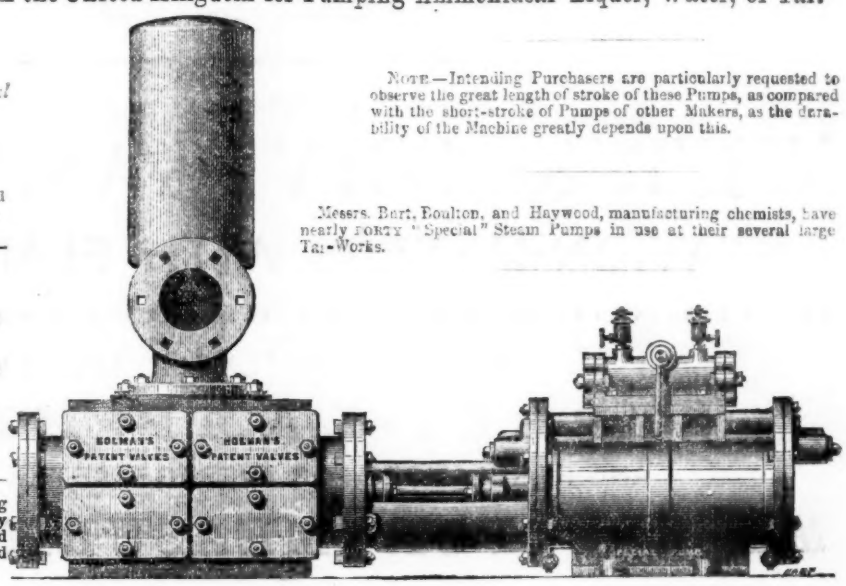
Upwards of 12,000 have been sold in England and America.

In use in a Hundred Gas-Works in the United Kingdom for Pumping Ammoniacal Liquor, Water, or Tar.

The following are a few of the leading Sizes in use in Gas-Works and Chemical Works:—

Diameter of Steam Cylinder.	Diameter of Water Cylinder.	Length of Stroke.	Gallons of Water per Hour, Approximate.	Reduced Prices.
3	1½	9	450	£16
4*	2	9	815	18
3	3	9	1,830	18
5*	3	12	1,830	22 10
4	4	12	3,250	25
6*	4	12	3,250	30
5	5	12	5,070	32 10
7*	5	12	5,070	40
6	6	12	7,330	40
8*	6	12	7,330	50
7	7	12	9,750	50
10*	7	12	9,750	65

* These sizes being usually selected for pumping Tar and Liquor, are always in stock, or nearly ready, fitted with all pump details in iron, and extra length distance piece between steam and pump cylinder at a small extra cost.



NOTE.—Intending Purchasers are particularly requested to observe the great length of stroke of these Pumps, as compared with the short-stroke of Pumps of other Makers, as the durability of the Machine greatly depends upon this.

Messrs. Burt, Boulton, and Haywood, manufacturing chemists, have nearly FORTY "Special" Steam Pumps in use at their several large Tar-Works.

London 1851. New York, 1853 Paris, 1855. London, 1862.

Dublin, 1865

The SIX MEDALS AWARDED to THOMAS GLOVER for

PATENT DRY GAS-METERS,

The latter being the Highest Medal awarded for Dry Gas-Meters by the Imperial Commissioners for the Universal Exhibition, Paris, 1867.

Paris, 1867.

THOMAS GLOVER & CO.,

DRY GAS-METER MANUFACTURERS,

214 TO 222, ST. JOHN STREET, CLERKENWELL GREEN,

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THOMAS GLOVER & CO.'S PATENT DRY GAS-METERS,

1st, Are a remedy for all the defects of Wet Meters;
2nd, Are suitable for all climates, whether hot or cold;
3rd, Incur no loss of Gas by evaporation;
4th, Cannot become fixed by frost, however severe;
5th, Are the most accurate and unvarying measurers of Gas;
6th, Prevent jumping or unexpected extinction of the Lights;
7th, May be fixed either above or below the level of the Lights;
8th, Cannot be tampered with, without visibly damaging the outer case;
9th, Will last much longer than Wet Meters;
10th, Will not cost more than one-half for repair that Wet or Water Meters do;
Are upheld for five years without charge.

WILLIAM PARKINSON & CO.,

(SUCCESSORS TO SAMUEL CROSLEY,)

COTTAGE LANE, CITY ROAD, LONDON, E.C.

Established 1816.

MANUFACTURERS OF PATENT

WET & DRY GAS-METERS,

STATION-METERS WITH PLANED JOINTS,

GOVERNORS, PRESSURE REGISTERS, GAUGES,

AND EXPERIMENTAL APPARATUS,

STREET-LAMP METERS,

AND REGULATORS FOR AVERAGE METER INDICATION.

METERS FOR MEASURING WATER.

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NOTICE TO SUBSCRIBERS.

Qualitative Analysis of Coal Gas.—*In some of the earlier copies of our last number, an engraving of the eudiometer tube, in column 1, page 155, was inserted upside down. The mistake was corrected as quickly as possible, and we have reprinted the page for any of our friends who may have accidentally received a defective copy, which we will forward on receipt of a stamped and directed envelope.*

THE JOURNAL OF GAS LIGHTING,
WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, AUGUST 8, 1876.

Circular to Gas Companies.

On Thursday last the Earl of Camperdown made a vain attempt to stay the progress of the Chartered Company's Bill in its penultimate stage. The Bill of the South Metropolitan Company, we may remark, had just before been read a third time and passed, without observation. Lord Camperdown's reason for moving the rejection of the Chartered Bill was evidently based on the fact that, the initial price in the Bill was 3s. 9d., while in the case of the South Metropolitan Company it is fixed at 3s. 6d. His object probably was to secure, in the end, an initial price of 3s. 6d. all over the Metropolis. He muddled the matter, however, so much in his speech that we can only guess at his intentions. He confessed that when he moved his amendment last week he did not know of the proceedings on the Board of Trade Bill in the other House; and then he went on to display his ignorance of what happened when the South Metropolitan Company's Bill was before Mr. Walter's committee, of whose existence and proceedings the noble earl had evidently never heard. Lord Camperdown in his ignorance supposed and asserted that the last-named company promoted a Bill, and of their own accord fixed the initial price at 3s. 6d. Our readers know the fact to be that the company promoted a Bill to obtain the initial price of 3s. 9d., which they thought they were certain to secure in consequence of the decision of Mr. Forster's committee last year. With the shallow information which Lord Camperdown possesses on the metropolitan gas question, it was not unnatural that he should jump to the conclusion that if one company proposed 3s. 6d. another might accept the same price. Lord Camperdown probably does not see why a west-end tradesman, who gives two or three years credit to a nobleman, cannot supply goods at the same price as the Civil Service Stores, which take only ready money—that is, however, in the way of parenthesis. The simple fact is, that for very good reasons, Mr. Walter's committee gave the Chartered Company 3s. 9d., and, on the representation of the two vestries, forced the price of 3s. 6d. on the South Metropolitan, which was accepted, not without wincing, on the part of many interested in the company. We have before expressed our astonishment and regret that the Bill was not withdrawn when the decision of the committee was announced. The initial price was accepted, but it is not exactly true that the company, of their own motion, promoted a Bill to fix the initial price at 3s. 6d. If they had, their proposal would not at all have affected the position of the Chartered Company, whose claim to 3s. 9d. had been ratified by Mr. Walter's committee. The simple fact is that this company could not possibly accept the lower price; and if an attempt had been made to force it upon them, it would only have resulted in the withdrawal of their Bill, and another prodigiously long inquiry next year. This has happily been averted, and we hope that, in the course of time, the best consequences will flow from the measure which may now be said to have become law.

The Marquis of Salisbury appreciated fairly the differing circumstances of the two companies whose Bills were under consideration. Whatever some may say, it cannot be alleged as a fault, that the capital of the Chartered Company, relatively to the sale of gas, is much larger than that of the South Metropolitan Company, and that, in consequence, a higher price is necessary to yield the statutory dividend on that capital. It must be regarded as a misfortune, and by none, perhaps, is it more keenly felt to be so than by the directors of the company. They have, however, to take things as they stand, and rigourously guard the rights of their shareholders.

Viscount Cardwell's reason for opposing the Bill is a very natural one. He has still in his mind the legislation of 1868, with the guarantee of ten per cent., and the revision clauses, for the protection of both shareholder and consumer. He would, therefore, prefer that matters should remain as they are, and, apparently objected to the new legislation, because it may give more than ten per cent. His contention, if he had expressed himself clearly, was, no doubt, something like Mr. Michael's—viz., that the statutory price of gas is the lowest sum which will yield ten per cent. With such an argument we may express a perfect agreement. We have never asked for more than ten per cent. But when Lord Cardwell argues that all the benefit to be derived from the new legislation will go to the producer, and none inure to the consumer, we totally disagree with him. The benefits, if any accrue, will be coincident, and will only be to the advantage of the producer in so far as an excess over ten per cent. may be obtained. To have been consistent, Lords Camperdown and Cardwell should have opposed the Bill of the South Metropolitan Company, which, with the initial price of 3s. 6d., is calculated to give, immediately, something more than ten per cent.; while it must be years, at the best, before the Chartered Company can make up their insurance-fund, and create a reserve, even with the price of 3s. 9d., and those funds must be provided for, before an increase in the rate of dividend can be thought of.

The Bills, however, are now passed, and the two companies have to make the best of them. We do not think that fresh legislation for them will be attempted for years; not, indeed, until the effect of the present measures has been clearly perceived. The other companies will go to Parliament as their necessities require, and they will, of course, have to accept the sliding scale, and the auction clauses, and what initial price they can get, with the understanding that they will accept nothing less than 3s. 9d. We are assuming, of course, that Mr. Farrer will abstain from further meddling. It is rumoured that Sir C. Adderley will presently "fall upstairs," and become a peer. His successor at the Board of Trade, if report prove true, is a man of very different calibre and experience, and, therefore, may not be so much under the influence of the permanent head of the department; and, being a commercial man, he may, like Mr. Bright, object to the constant harassing of gas companies.

The excuse alleged for all recent legislation on metropolitan gas affairs has always been the desire to bring about uniformity in all conditions. The Regulations Bill of the Metropolitan Board, if it had succeeded, would have established such uniformity. That it failed was owing to causes which need not now be particularized. The single outcome of all last year's efforts was the Commercial Company's Act, which embodied the provisions of the Regulations Bill. We need hardly say that we congratulate this company on the accident that has placed them in an exceptionally favourable position. They have escaped the auction clauses, for last year these were not dreamt of in the Metropolis. Whatever may be done in the future, no attempt, we may assume, will be made to take away their right to allot the new capital to existing shareholders at par. The Commercial Company have also the first experience of the sliding scale. Their initial price is 3s. 9d., and they charge that price, so the question will be how to dispose of the profits in excess of ten per cent. The next report of the company will be looked for with some curiosity.

We have already pointed out that the Commercial Company have escaped the auction clauses, but with this exception the provisions respecting the raising of new capital are identical in the cases of the three companies whose Bills we are now considering. Half such capital is to be raised by way of loan and half by means of shares; and there are some formalities to be observed, which need not here be mentioned, to compel the raising of the capital in the way described, and afterwards to prove that the money is actually required by the company. It should, however, be pointed out that, in the case of the South Metropolitan Company, the loan capital authorized, in respect of share capital sanctioned by previous Acts, must be issued before any of the capital authorized by the present Act can be raised. Thus it may be some two or three years before any shares in this company will be offered for sale by auction. And since the Chartered Company have yet unexhausted powers to raise and call up a little over a million, it might be some years before the auction clauses take effect, but for the fact that the company will next year be large purchasers of land. In any case, as we said last week, the dilution of dividend-bearing capital will be a slow process; and whatever good may come of the present legislation, it must not be expected at once.

We have endeavoured to show that the uniformity so much desired is as far off as ever, except as regards the quality of the gas supplied; and this has been brought about more by the spontaneous action of the companies than by legislation. Sixteen-candle gas may now be said to be distributed all over the Metropolis, but the price varies as before. It is not a serious grievance, but it is a constant source of irritation, which can only be removed by amalgamation. Let us hope that this question is now engaging the serious attention of the southern companies.

We publish to-day a paper, translated from the *Comptes Rendus* of the French Academy of Sciences, on sulphur in gas. At Odessa we imagine that M. Vérigo is not troubled by either an Act of Parliament or Referees, so we assume that his studies had only a scientific object. In order to detect sulphurous acid, the author used the same test we employed—viz., strips of paper wetted with a solution of starch and iodate of potash. Our room we believe had a considerably larger cubical capacity than that in which M. Vérigo experimented, and the strips of paper were suspended in the middle of the room, about a foot and a half from the ceiling. We obtained no evidence of the presence of sulphurous acid in the atmosphere of the room, and the conclusion we drew was, that all formed was very rapidly oxidized to sulphuric acid, of the action of which there was abundant proof in the room. M. Vérigo succeeded in obtaining proof of the presence of sulphurous acid, but is equally convinced of its rapid oxidation. We need make no remark on his other experiments, the results of which support the conclusions of all the English chemists who have experimented on the matter, and not merely calculated. The gas M. Vérigo used, it will be seen, yielded about 32 grains of sulphur per 100 cubic feet. The remark of M. Berthelot will, of course, not be overlooked.

A difficulty, we notice, has sprung up with regard to the purchase of gas-works by local authorities, under the Public Health Act, 1875. As we read section 162 of this Act, the Local Government Board have power to sanction, at their discretion, the raising of loans to complete such purchases, without further formalities. It seems, however, that a majority of the law officers of the Board are of opinion that, before the sanction can be obtained, a Provisional Order, under the Gas and Water-Works Facilities Act, must be procured. As these Orders under the Public Health Act are granted by the Local Government Board, it would appear that the sanction must be conveyed by the Order. The unexpected difficulty delays the purchase of the Burslem and Lichfield undertakings by the respective local authorities, and has given rise to some irritation. The Burslem Local Board have been urging Mr. Sclater-Booth to give them the benefit of the doubt, but at present he does not seem inclined to do so.

A step has been taken which may lead to a more amicable understanding between the United Company and the Town Council of Liverpool. The Council wish to have regulators (4 feet) affixed to the public lamps, and offered to pay half the estimated expense —from £1000 to £1300. The directors of the Company have, however, resolved to provide them at the cost of the Company. From what we have seen of the public lighting of Liverpool, we have a strong suspicion that the Company will soon be recouped for the outlay.

The Town Council of Salford, like many gas companies, are worried by complaints, that, although no more gas had been consumed, the bills had doubled in amount during the past year. The curt advice the consumers get is, to look after their meters and pipes. A similar complaint is made at Tamworth; but, in this case, by the Town Council against the gas company. Here, however, a direct cause is alleged. A member of the council asserts that the company have erected a steam-engine to drive atmospheric air through the meters. The moral education of this person, we think, must have been sadly neglected. The fact, probably, is, that the company have put up an exhauster.

The meetings of the York United Gas Company are always of a satisfactory character. The undertaking is one of the best managed in the kingdom, and the directors endeavour strictly to fulfil the obligations imposed by the general Acts. "Our policy," said the chairman, "is, and always has been, to apply surplus profits (above ten per cent.) in reduction of price." In consequence of this policy, the price of gas (fourteen candle) in 1873 was only 2s. 6d. per 1000 feet. It is now 3s.; but the directors hope soon to be able to make a reduction. For the present they have to abstain, because of the depressed state of trade, which obliges them to sell coke at a very low price. We all, however, hope for improved circumstances; and when they arise, we are confident that the gas consumers of York will get the benefit of them.

Our space to-day is exhausted, and a few words must suffice to dispose of some other items of intelligence. The Town Council of Hanley are threatening to take steps to effect a compulsory purchase of the undertaking of the British Gas Company in their district. The Local Board of Balsall Heath and the Corporation of Birmingham are in dispute. The Corporation have reduced the price of gas to private consumers by 3d., but to the Local Board only 1½d. This is denounced as a "regular trick." At Elland a public meeting has been held, at which a vote of censure on the Local Board was passed, for involving the ratepayers in heavy expenses by law proceedings against the gas company. We know nothing of the matter in dispute, but fully agree with the opinion of the meeting that, whichever side may win, the ratepayers and consumers will have to pay all the costs.

The only other item which calls for notice is the report of the Gas Committee of the Corporation of Glasgow, which will be found in another place. The committee find themselves with a balance of profit amounting to £28,736, and, accordingly, they very properly resolve to reduce the price of gas from 4s. 7d. to 4s. 2d. per 1000 feet, the reduction to be retrospective.

Water and Sanitary Notes.

Contrary to our expectation, the Government have pushed the Rivers Pollution Bill through the House of Commons, and will, no doubt, force it through the House of Lords. Frankly speaking, we believe the measure will do very little good, and, happily, is not calculated to do harm. It is described by some as a "manufacturer's bill," and, as we originally pointed out, it is a distinct measure of centralization. The local authorities are deprived of all powers of taking proceedings against manufacturers for polluting streams with manufacturing refuse; but the authorities themselves are still open to attack for sending sewage into rivers. Time alone can show what may be the effect of the measure; but at the very best we can only regard it as a possible basis for subsequent legislation.

Mr. Nelson, the solicitor to the Corporation of the City of London, who happens also to be chairman of the Local Board of Hampton Wick, has published a letter addressed to the authorities between Hampton and the Metropolis, proposing a plan for joint operations for the disposal and utilization of their sewage. The plan proposed or advocated by Mr. Nelson is, to carry the sewage of the several places to Hanworth, a point about equidistant from each, and then, where it could not be a nuisance to any one, establish filtering beds and a sewage farm. We have no space to discuss the matter; but we may state our opinion, that the scheme deserves the serious consideration of the authorities.

The disposal and treatment of sewage our readers know is a difficulty in the pottery towns. The Town Council of Newcastle-under-Lyne, we see, have just entered into an arrangement to treat their sewage on Fulda's plan—viz., by precipitation with lime and sulphate of soda. We hope the results anticipated may be experienced.

Liverpool is still agitated on the water question, and Alderman Bennett, the persevering advocate of an extension of the well system, has recently found strong support in an opinion obtained from Mr. W. Boyd Dawkins, of the Geological Survey Office. This gentleman believes that the present wells only reach the surface of the water-bearing stratum, and, of course, he suggests deeper borings. He admits that the amount of water stored up in the sandstone under Liverpool can only be ascertained by experiments, but suggests that these need not be costly. The time is fast approaching when the Town Council must decide on one plan or another, but we shall not anticipate their decision. Unfortunately for them, but fortunately for most, the Borough Funds Act remains unrepealed.

We have only space to record that at an extraordinary meeting of the shareholders in the Wakefield Water Company, held on

July 24, the provisional agreement made for the transference of the undertaking to the Corporation was confirmed. The chief heads of the agreement are as follows:—The Corporation are to pay the Company £48 for each paid-up £25 original share; £24 for each paid-up £12 10s. share; £11 for each paid-up £10 share; and also to take upon themselves all the debts, liabilities, and obligations of every nature and kind of the Company, as shown in the certified balance-sheet of the 30th day of June, 1876; the intention of the Corporation being that the Company shall receive the full amount of the purchase-money, free from all deductions. The purchase is to be completed on or before the 30th day of June, 1877. The Corporation will be entitled to all the water rates and rents or other the revenue of the Company from the 30th day of June, 1876, and will pay interest on the purchase-money from that day at the rate of five per cent. per annum until completion. The directors decided on pensioning the secretary and collector of the Company, but the liberal proposal they made was cut down by one-half at the meeting.

A TREATISE ON THE SCIENCE AND PRACTICE OF THE MANUFACTURE AND DISTRIBUTION OF COAL GAS.

CIII.

Specific Gravity of Coal Gas.

Bromine Test.

The condensation which coal gas suffers when subjected to the action of chlorine or bromine, has long been taken as a practical indication of the quality of the gas with respect to its poorness or richness in luminiferous constituents. The actual value, however, of the test has been much disputed, some holding the opinion that it is of but little use, while others, amongst whom are Dr. Fyfe and Mr. Lewis Thompson attach much value to its indications. Whatever divided opinions there may be on the subject, there is no doubt whatever that both bromine and chlorine form liquid combinations with the richer hydrocarbons of coal gas, and that after having been submitted to the action of either of these reagents, the gas becomes reduced in volume, and is found to have lost the greater portion of its illuminating value. The greatest objection to the *accuracy* of the test is that made by Dr. Frankland—viz., that the liquids which are formed by the action of bromine or chlorine on hydrocarbons are extremely volatile in their nature, and that the tension of their vapours enlarges the observed volume of the residual gas to a degree which neither admits of estimation nor correction. Be this as it may, there is but little doubt that the bromine test may be taken as affording a very useful, although not strictly accurate, test of the comparative richness or poorness of different specimens of coal gas in luminiferous constituents.

The method of applying the test is as follows:—A Cooper's tube, such as is represented in the accompanying diagram, is filled with water, which is then displaced by the gas to be tested, and the volume of the gas is adjusted to correspond with the lowermost graduation on the tube. The temperature of the gas is then equalized by placing the tube vertically in a vessel of water, which may conveniently be a glass jar, of sufficient height to allow the tube to be completely submerged. The jar should have a thermometer suspended in it to indicate the temperature. After the tube has remained for a short time in the water, it may be removed, and, in the event of the volume of gas not having altered, the experiment proceeded with. If the volume of the gas has changed, it must be again adjusted to its proper level before proceeding further. A small fragment of caustic potash is then dropped into the short limb of the tube, which must be completely filled with water, and the orifice firmly closed by the thumb, care being at the same time taken not to introduce any air. The tube is then inclined so as to allow the potash to slide down the long limb, and thus come into contact with the gas. The caustic potash is introduced in order to absorb any carbonic acid which might be present, and which, if not removed at this stage, would subsequently give rise to an erroneous result. After the potash has been brought into thorough contact with the gas, which is best accomplished by a slow horizontal agitation of the tube and contents, the thumb is removed, and the normal temperature of the gas restored by transferring the tube to the water vessel. A short time being allowed for the equalization of temperature, the tube is removed from the water and the volume of the gas observed, any absorption which may have taken place being noted. The solution of potash must then be as far as possible removed, which may be best accomplished by plunging a piece of thick glass rod into the short arm of the tube, which thus displaces the potash solution, which may then be replaced by bromine water, or a drop of liquid bromine. The short limb of the Cooper's tube being completely filled, the tube is again agitated in order to bring the bromine into intimate contact with the gas; the bromine should be present in sufficient excess to impart an orange tint to the gas under experiment. The excess of bromine should then be removed by the addition of caustic potash solution, and subsequent agitation, until all red vapours have disappeared, when the absorption may be judged to be complete. The tube is then transferred to the jar of water, and after the temperature of the gas has become reduced to a normal amount, the diminution in volume which the gas has undergone from the action of the bromine may be observed. The principal substances removed by bromine from coal gas are—Olefiant gas ($C_2 H_4$), propylene ($C_3 H_6$), and butylene ($C_4 H_8$), all of which belong to that class of organic compounds known as "olefenes." They are likewise the first three members of a well-marked homologous series, of which twelve members are at present known. The products formed under the action of bromine or chlorine are substitution compounds, in which a portion of the component hydrogen is replaced by chlorine or bromine respectively.

With regard to the amount of condensation which different qualities of gas undergo, under the influence of bromine, the per centage may vary from as low as 3·5 in poor quality of gas up to as much as 30 in the gas obtained from such a rich material as "Boghead." The actual per centage of condensation from different qualities of gas will be seen from the table given below, which also shows the corresponding specific gravities and illuminating powers:—

Name of Coal.	Gas per Ton in Cubic Feet.	Illuminating Power in Candles.	Specific Gravity of Gas.	Condensation by Bromine.
Pelton	11,000	14·0	·430	4·5
,, Cannel	11,500	18·5	·520	10·5
Leverson	10,800	12·5	·425	4·0
,, Cannel	11,600	18·0	·523	10·0
Washington	10,000	14·0	·430	5·0
,, Cannel	10,500	18·0	·500	10·5
Pelaw	11,000	12·75	·420	4·5
New Pelton	10,500	12·0	·415	4·75
Dean's Primrose	10,500	13·5	·430	5·0
Garesfield	10,500	11·5	·398	3·75
Gosforth	10,000	12·0	·402	4·0
West Hartley	10,500	12·5	·420	4·2
Hastings Hartley	10,300	12·5	·421	4·3
Blenkinsopp	9,700	14·0	·450	6·0

A curious circumstance in connexion with the bromine test is mentioned by Mr. Lewis Thompson in "The Chemistry of Gas Lighting"—viz., that the specific gravity of the condensed matter multiplied by the per centage condensation gives a number which represents, as nearly as possible, the illuminating power in standard sperm candles.

It is impossible to conceive that the results obtained are otherwise than curious coincidences, at the same time the agreement, as exhibited in the following table, between the observed and "calculated" candle power, is certainly very striking. It must be remembered, however, that the "observed" lighting power would at the present time be some four candles higher than the figures given, which were in all probability obtained from experiments in which the old iron Argand was used. With a quality of gas which this burner would indicate at 12 candles, Sugg's "London" Argand would indicate 16 candles. It, therefore, follows that Lewis Thompson's method of calculating the "photogenic power" "by analysis" would be valueless, as applied to the modern method of estimating "actual" lighting power.

The following table, from "The Chemistry of Gas Lighting," shows the correspondence observed by Mr. Evans and Lewis Thompson between the calculated and observed lighting powers:—

Name of Cannel.	Gas per Ton in Cubic Feet.	Condensed per Cent. by Bromine.	Specific Gravity of Gas.	Specific Gravity of Condensed Matter.	Photogenic Power.	
					Actual.	By Analysis.
Boghead	15,000	30·0	·752	1·21	37·75	36·3
Lesmahagow, No. 1	13,500	16·0	·642	1·64	27·1	26·24
,, No. 2	13,200	17·0	·618	1·43	24·8	24·31
Capeldrae	14,400	16·5	·577	1·29	19·75	21·28
Arniston	12,600	17·0	·626	1·40	22·5	23·8
Ramsay	10,300	12·5	·548	1·82	21·4	22·95
Wemyss	14,300	14·5	·580	1·87	24·5	27·11
Kirkness	12,800	10·2	·562	1·95	21·2	19·88
Knightswood	13,200	9·5	·550	2·28	19·0	21·66
Wigan (Ince Hall)	11,400	11·5	·528	1·77	20·0	20·35

The method by which the "specific gravity of condensed matter" is ascertained is best illustrated by the following quotation from "The Chemistry of Gas Lighting:"—"Thus, for example, a gas of specific gravity ·447 has given a condensation of 5 per cent., and left a residuary gas of specific gravity ·328; then since 100 cubic inches of the former weigh 13·633 grains, and 95 of the latter weigh 9·504 grains, the condensed portion must have weighed the difference, or 4·129 grains; therefore the specific gravity of these five cubic inches of condensable matter is 2·70, and this, multiplied by 5, or the per centage condensation, gives 13·5 candles for the 5 cubic feet of such gas, which, in this case, was actually 14 candles by the photometer."

(To be continued.)

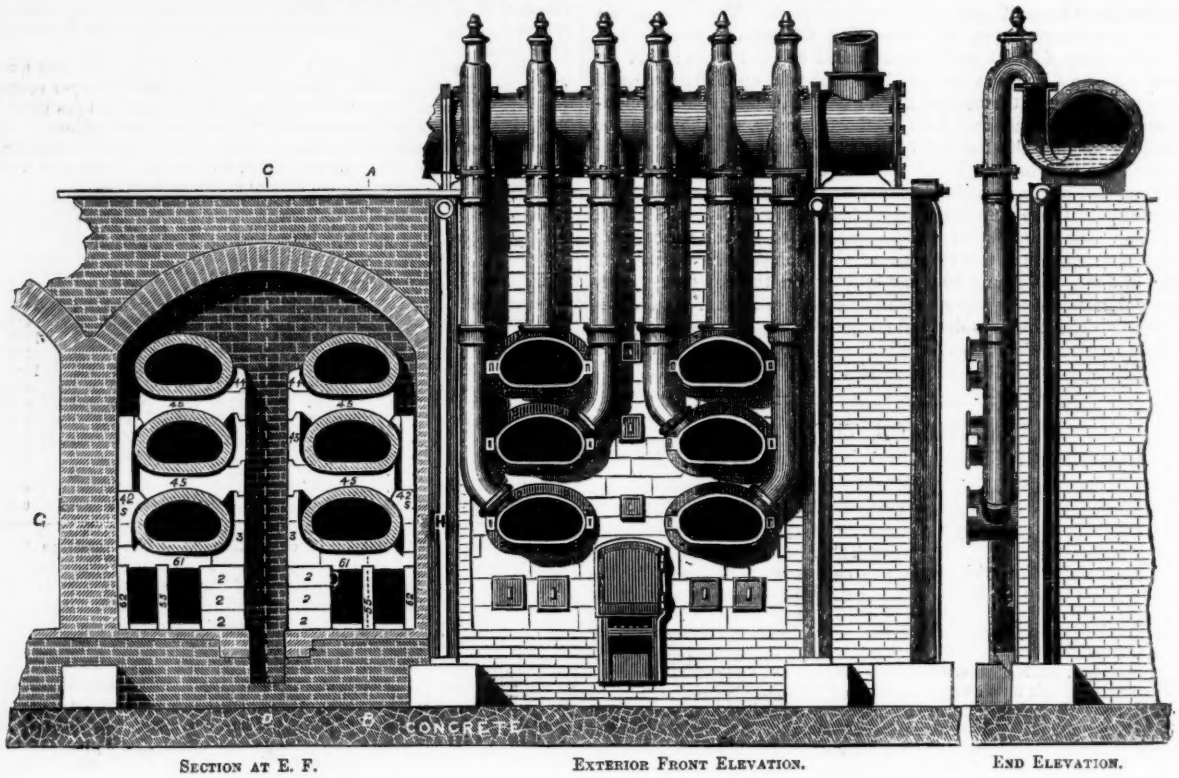
ANNUAL ACCOUNTS OF GAS COMPANIES.

The Gas-Works Clauses Act, 1871 (34 and 35 Vict., c. 41), enacts that the provisions of this Act shall apply to every gas undertaking authorized by any special Act hereafter passed, or by any Provisional Order made under the authority of the Gas and Water Works Facilities Act, 1870. The Court of Queen's Bench decided last year, on an appeal in the case of the Commercial Gas Company *v.* Scott, that the Act of 1871 had a retro-active effect, and applies not only to companies hereafter incorporated, but also to all companies which had already incorporated in their special Acts the provisions of the Gas-Works Clauses Act, 1847, the two Acts to be read as one.

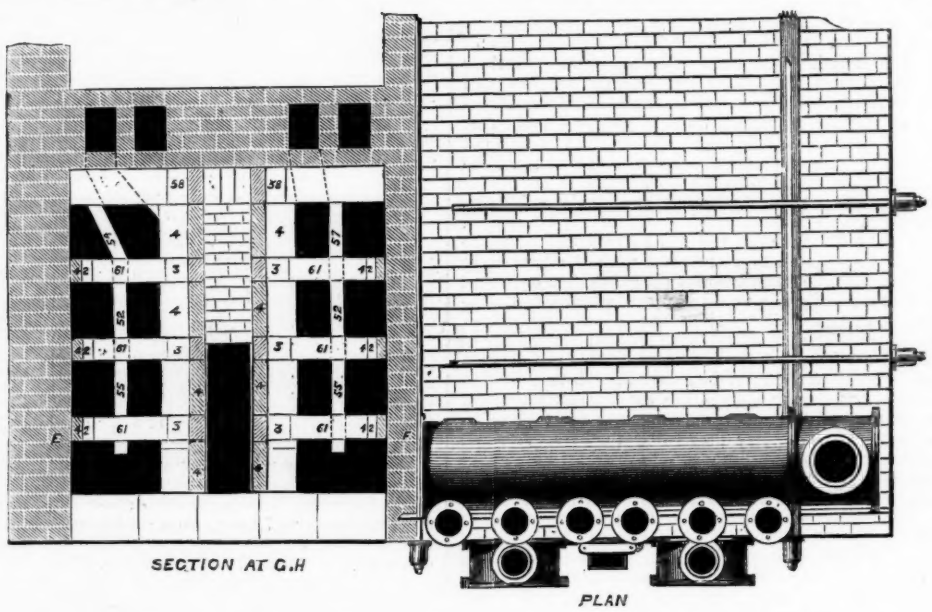
By the 35th section of the Act of 1871, the following provisions are made in reference to accounts:—

"The undertakers shall fill up and forward to the local authority of every district within the limits of the special Act, on or before the twenty-fifth day of March in each year, an annual statement of accounts, made up to the thirty-first day of December then next preceding, as near as may be in the form and containing the particulars specified in the Schedule B to this Act annexed.

RETORT-SETTINGS AT THE NEW YORK GAS-WORKS.



SECTION AT E. F. EXTERIOR FRONT ELEVATION. END ELEVATION.



"The undertakers shall keep copies of such annual statement at their office, and sell the same to any applicant at a price not exceeding one shilling for each such copy.

"The Board of Trade, with the consent of the undertakers, may alter the said forms for the purpose of adapting them to the circumstances of the undertaking, or of better carrying into effect the objects of this section.

"In case the undertakers make default in complying with the provisions of this section they shall be liable to a penalty not exceeding forty shillings for each day during which such default continues."

Although the Act thus provides for a definite statement of accounts, no "forms" for the purpose have been issued by the Board, and a large amount of labour is thus entailed upon companies, especially those in the provinces, where the clerical staff is frequently limited. To meet this difficulty, and in compliance with the request of a number of our friends in the country, we are now having prepared "Forms of Annual Account" arranged as required by the Act, and so printed and ruled as to afford the greatest facility for filling up. These forms will be printed on large sheets of stout writing paper, with scarlet borderings and properly endorsed, requiring only the introduction of the name of the company and the figures under the respective headings.

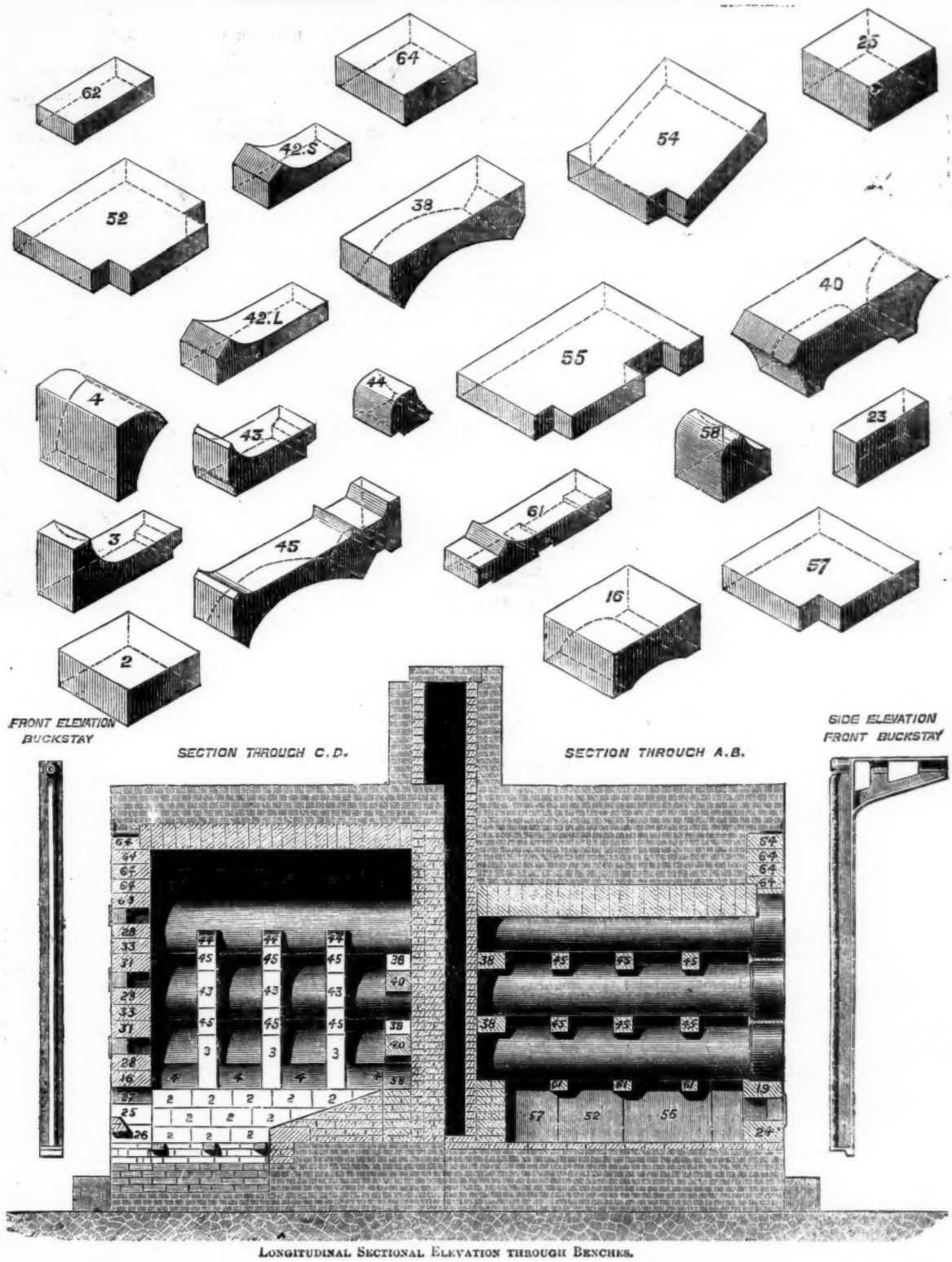
Correspondence.

RETORT-SETTINGS AT THE NEW YORK GAS-WORKS.

SIR,—Knowing that Mr. Rowland, of the Continental Iron-Works, Brooklyn, was erecting his improved stoking machinery for working a range of retorts at the New York Gas-Works, I wrote to ask him respecting the sort of setting he would have to contend with. The answer brought with it the enclosed tracings, and, as you are publishing all the practical appliances in connexion with gas lighting that you can get knowledge of, I have sent them on to you as a contribution in that direction. That the setting is a good one, is proved by my correspondent being able to state that the average make per mouthpiece is 7500 per day, and the quantity of gas per ton over 10,000 cubic feet; there is a per centage of cannel used. The retorts cannot be called D shape, they are nearer oval, 24 inches by 13 inches, and 8 feet long. If these are the sort of retorts that Mr. Rowland has to draw and charge by machinery—and I am told by a person who has seen some of the experiments that he can do it—all I have to say is, that we who have been so long dabbling with such apparatus, have something to learn from t'other side of the water.

But what interests me most in connexion with this setting is the hydraulic main, the invention of the engineer of the company, Mr. Stanley. This main, Mr. Rowland, who has erected several of them, says, is a decided remedy for what we have heard so much of lately, that is, thick tar; and this was my impression immediately I saw the drawings.

RETORT-SETTINGS AT THE NEW YORK GAS-WORKS.



LONGITUDINAL SECTIONAL ELEVATION THROUGH BENCHES.

I have stated the purpose for which the drawings were sent me, and, therefore, have no descriptions to offer. To the practical man, I think, they will speak for themselves.

W. MANN.

Aug. 5, 1876.

RIGHT *VERSUS* WRONG.

SIR,—On reading over the proceedings of the North British Association of Gas Managers, as reported in the last issue of your valuable JOURNAL, I was gratified to see that Mr. Watson, of Edinburgh, had brought before the members a subject not of a pleasant nature but still of very great importance. I have not seen the correspondence in the *Glasgow Herald* to which he referred, but from Mr. Watson's remarks one can easily infer what the tenor of that correspondence was.

It is a pity, I think, Mr. Watson spoke in the terms he did, as his remarks looked rather like a justification of the unjust manager, and a severe condemnation on the coalmasters; although I know it was not Mr. Watson's meaning that such an interpretation should be put upon his remarks. It is an old proverb, "A child may lead a horse to the water, but ten men cannot make him drink;" any one can, or may, offer a bribe to a gas manager, but ten coalmasters could not make an honest man accept of it.

The fact is, this system of "tipping" is rotten, and it is high time it was exposed. Why, Mr. Editor, would you believe it? I have seen a letter from a certain gas manager to a coalmaster, in which he said if his private commission was not increased to 2s. per ton he would use no more of his coal. Now, this is no novelty; the same thing is going on at the present moment, and to some extent.

There are many gas managers who excuse their conduct, by saying, "Our salaries are so small; we must have our commissions, to keep us and our families living." To such I would say, if you wish to keep your salaries low, continue your system; but if you wish your directors to remunerate you better, then show by your results what you are worth, which can be done by buying at the cheapest market, thereby giving your employers (who are entitled to it) the benefit.

There are other gas managers who justify their conduct by saying, "There is no harm in it." Perhaps not; but that it is very dishonest I think I can prove. Supposing a gas company employ a man to manage their works, at a salary of, say £100 per annum, in return for which he

is to "devote his entire time to the duties of his office," what are his duties? To put these into small compass, he is to do the very best for his company.

Supposing some coalmaster may be foolish enough to offer this manager, say 1s. per ton as commission (and this is common), and suppose that the manager accepts his bribe (and this is common), this rate on 100 tons is £5. But suppose this sum had been taken off the price of the coal, the profits of the company would have been improved by this amount. I ask, then, what business have the profits of the company, or any portion of them, to be put into the manager's pocket.

But this "tipping" is not confined to coals or coalmasters—retorts, bricks, pipes, meters, and, in fact, everything that enters a gas-works may be made the cause of this illicit traffic.

In these remarks, you may think I exonerate from all blame those persons who offer the bribe, which I do not; their practice is decidedly wrong, but I have confined myself to the manager's side of the question.

What a grand thing is independence. How freely and forcibly a man can talk when he knows that all his transactions have been open and straightforward; but what a slave he must be who places himself under the thumb of another, who might at any time turn round and give evidence against him. There is also a higher ground from which we may view the system spoken of. There is the knowledge of right and wrong, there is the approving conscience, which is a pleasant thing to carry about with one, and should not be sold for money.

In the above remarks will be found matter of offence to many; that I cannot help. In writing thus, my object has been to expose a wrong thing, to encourage those who steer clear of this mistaken course, and to give a word of advice to those of my professional brethren who are indulging in what I consider a great wrong.

Gas-Works, Bury St. Edmunds, Aug. 4, 1876. JOHN M'CRAE.

GAS ANALYSIS.

SIR,—I am not surprised that my objections, as stated in my letter of the 13th of June, in reference to the methods in use by public analysts for determining and reporting the illuminating power of gas, should have remained so long unchallenged; nor that the kindly-meant letter of "Chemicus" of the 1st inst., intended by him to relieve my difficulty, should have entirely failed of its object, as it really does not touch the matter at all. "Chemicus" would seem to argue that, because it is customary at all the London gas-testing stations to follow a particular method for ascertaining the illuminating power, it is therefore right. I merely repeat that it is these so-called customs and methods that I object to, believing them to be inherently wrong. The illustration he furnishes merely explains that gas expands or diminishes in bulk with the rising and falling of the temperature and pressure, about which there is no question whatever.

Let "Chemicus" put himself in the position of a gas consumer, who contracts with a gas company to supply him with gas of a given quality at a fixed price per cubic foot; it must be obvious that, should the photometer show, at all times, that each cubic foot carries the illuminating power agreed upon (say, 25 candles from the light of a burner consuming 5 cubic feet per hour), I ask "Chemicus" to say, in such case, what has the temperature or pressure of the atmosphere to do with the matter between him and the gas company?

Every gas manager supplying gas of high illuminating power knows the necessity of studying the state of the weather, and of making careful selection of the qualities of coal to maintain an uniform quality of gas; and this varies greatly with the seasons. In fact, the manufacture of the day is for the consumption of the evening, and, whether in summer heat or winter cold, the rule is, "Sufficient for the day is the gas thereof," and if the quality is what is agreed upon there is nothing to complain of. What would be thought of a law enforced on ships officers for determining the position and course of a ship at sea, if all the daily observations of winds, tides, and currents were to be reduced to an imaginary half-gale from the N.E., and an ocean current setting in from the N.W.; or if some scientific hatter should set up a standard of crania under which he should undertake the fitting and selling of hats? He would probably find difficulty in satisfying his customers with a too tight or loose fit by any trick of calculation to prove that the article was of the regulation size and pattern.

Perhaps "Chemicus" will better apprehend the matter in question by supposing that a given volume of gas, say one cubic foot, at the temperature of 60° and barometer at 30 inches, contains a specific value of illuminating elements in its composition. He will, I daresay, admit that these elements are still present in their entirety, whether the cubic foot with which they are bundled up should be compressed into half a cubic foot or expanded into two cubic feet; the only change being that in the first case the illuminating elements would be doubled, and in the second case reduced to one-half of what they were relatively in the original condition of 60° Fahr. and 30 inches Bar. This is what, in a lesser degree, takes place when the measured foot of gas is taken in very cold or very hot weather, and is so received and measured off to the consumer. But the analyst, when the weather is cold, calculates the quality downwards, below what it really is, to the prejudice of the gas company, and merely carries the absurdity in the opposite direction when the weather is hot. It would, perhaps, be unjust to impute intentional error or red tapeism to the framers of the rules for testing gas, or to magnify unduly the amount of error occasioned thereby. That there is error I have endeavoured to show, and hold that it should be corrected, or satisfactorily shown to be otherwise. It seems to be a good illustration of the proverbial case of misfit between a square pin and a round hole.

A. MICAWBER, jun.

Glenmutchkin Gas-Works, Aug. 4, 1876.

PURCHASE OF THE EVESHAM GAS-WORKS.—At the quarterly meeting of the Evesham Town Council, on Wednesday last, it was decided to purchase the works of the gas company at a valuation under an agreement between them and the town authorities.

HASTINGS WATER SUPPLY.—The foundation stone of the new engine-house and pumping-station at Buckshole, near the pleasure gardens, has just been laid. The engine will be erected on designs furnished by Easton and Anderson; and the two filtering-beds adjoining, estimated to filter 100,000 gallons per day, are constructed from designs by Mr. Doowra, of London. There are now four wells sunk in the Buckshole Valley, the greater portion of the water being obtained from deep springs.

Parliamentary Intelligence.

HOUSE OF LORDS.

MONDAY, JULY 31.

The Halifax Water and Gas Extension Bill was read the third time, with the amendments; further amendments made, and bill passed.

The Wakefield Water Bill was read the third time, with the amendments, and passed.

THURSDAY, AUGUST 3.

The South Metropolitan Gaslight and Coke Bill was read the third time, with the amendments, and passed.

THE GASLIGHT AND COKE COMPANY BILL.

The Duke of RICHMOND and GORDON moved that this bill be read the third time.

The Earl of CAMPERDOWN: I believe it is unusual to object to a bill on its third reading; but there has been already a discussion on the subject of this bill, and, as your lordships are aware, there was a small majority against the amendment that I then proposed. Except under the extraordinary circumstances of which I was not aware until after the termination of that debate, I should not have troubled the House further on the question. It is because of those new circumstances that I am now desirous to ask your lordships whether you will read this bill the third time. After the division on Thursday, there remained, as there were before, three gas bills before Parliament. There was in this House two private bills—The Gaslight and Coke Company Bill, which we are now discussing, and the South Metropolitan Gas Company's Bill—and there was before the House of Commons a public bill for the whole of the South of London, embracing the district of the South Metropolitan Company, and which was promoted by the Board of Trade, who desire that there should be an uniform supply of gas throughout the whole of the Metropolis, at the initial price to the public of 3s. 9d., without regard to districts. In the past discussion a statement which had been issued by the Board of Trade was referred to. In this an amalgamation between the Chartered Gas Company and two other companies is mentioned, by which the supply of gas in the north of the Metropolis will be in the hands of one company; and it goes on to say that "Three out of the four companies supplying gas south of the Thames—viz., the Phœnix, the London, and the Surrey Consumers—have come to an agreement with the Metropolitan Board of Works to adopt the same terms as are contained in the Bill of the Chartered Company; and a bill, embodying these terms, is now before the House of Commons. Should that bill and the bill of the Chartered Company become law, there is every prospect that there will be two amalgamated companies—one to the north and one to the south of the Thames—subject to the same conditions, and that the long and vexed question of Metropolis gas will be satisfactorily settled." But that is merely the opinion of the Board of Trade. In their opinion, the charge for gas all over the Metropolis ought to be uniform. Well, the bill for the amalgamation of the three companies in the south of the Metropolis was objected to by two parishes—the parish of Camberwell and the parish of Lambeth—who were supplied by the South Metropolitan Company; and their objection, which on the face of it appears to be perfectly reasonable, was that every year this company had been supplying gas at 3s. per 1000 and that with that price they had been dividing 10 per cent. The bill promoted by the company fixed the initial price at 3s. 6d., and the vestries maintained that to make the initial price 3s. 9d. would be simply to increase the dividends of that company very greatly, to the injury of the consumer. The bill was considered by a committee, of which Mr. Forster was the chairman, and the first witness called for the bill was Mr. Farrer, permanent secretary to the Board of Trade. It is not for me to say whether the evidence in support of that bill was or was not satisfactory, but I may state that immediately on the completion of that gentleman's evidence the Metropolitan Board of Works met together, and, according to the report of the proceedings, their opinion of that gentleman's evidence was not very complimentary to his knowledge of the subject; and what is more important is that the committee, after hearing Mr. Farrer's evidence, decided, without expressing an opinion on the merits of the question, that they did not feel themselves justified in proceeding with the bill, and they advised the promoters to see if they could not come to a compromise with the opponents. The promoters and the opponents did not come to a compromise, and the bill fell through. Therefore, your lordships will understand you will be obliged to consider next year what is the proper initial price of gas for the south side of London, and that, whether you see fit to pass this bill on the present occasion or not. There were some doubts whether the South Metropolitan Gas Bill was to be proceeded with, but those doubts have been solved, and the bill has now been read the third time, and from the day on which the bill comes into operation the company, on their own motion, will be limited in their charges to 3s. 6d. for their district. Well, now, my lords, to proceed with the bill which we have before us. Bills of gas companies appear just like rabbits coming out of their holes in a warren, and then going in again. They appear and disappear just as it happens to suit their interests for the moment. I venture to suggest that it is highly desirable, when you are legislating on this subject, that your lordships should thoroughly consider the whole subject, and should then legislate upon it all at one time. One of the reasons which the Board of Trade give for pressing this bill is now taken away. Your lordships are asked to pass this bill, which relates only to the northern part of the Metropolis, and thereby to prejudge the question as regards the south of the Metropolis. If, however, you sanction the initial price of 3s. 9d., you will not be doing what the Board of Trade originally proposed. What the Board recommend is, that you should pass a bill establishing an uniform initial price of 3s. 9d. all over the Metropolis. This you cannot do without an inquiry; and I am sure Lord Redesdale will bear me out that there can be no inquiry in this House this session, and that all you are able to do is to pass a bill which will establish a charge of 3s. 9d. that will bind the whole of the north of the Metropolis. If you pass this bill, and if this bill is found to work unsatisfactorily, you cannot retreat from that position. You have just now passed a bill establishing a charge of 3s. 6d. for the south of the Metropolis, and if that is found insufficient, you can increase it, and enable the company to charge a higher sum; but if you once enable the company to charge more than is adequate, the company will have you at their mercy, and, whatever terms you may endeavour to make on behalf of the public, you will not be able to get better terms than those in this bill. For those reasons I ask you not to read this bill the third time. I am sure the Duke of Richmond will bear me out in saying that I have offered no factious opposition to the bill. All I have been anxious for was to have an inquiry, which I have asked for more than once. I understood that a select committee was agreed upon. I think that this House should not pass a measure which, under any circumstances, is only partial legislation, which must come under review at some future period, and which, after the inquiry which will have to be made in reference to the south side of London, your lordships may possibly regret. I move that this bill be read the third time this day three months.

The Marquis of SALISBURY: The noble earl talks of these bills coming up like rabbits from their holes. I do not know precisely what inference he wishes your lordships to draw from the use of this metaphor. As a matter of fact this bill has passed through the ordinary stages, and been subject to the ordinary precautions which are usually applied to measures of this kind. This bill, to the third reading of which the Earl of Camperdown has taken the remarkable course of objecting was drawn up subject to

the approval of the Board of Trade, of the Metropolitan Board of Works, and of the Corporation of the City of London. It was introduced to the House of Commons, referred to a committee there, and passed. It was subsequently introduced to your lordships House, examined by a committee here, and passed. It was then referred to a committee of the whole House, and approved of by your lordships, and now, at the end of all those proceedings, which rather exceed in number the precautions under which bills of this kind are ordinarily subjected to, the noble earl comes and asks you to reject the bill altogether. There is one advantage, at all events, in the proposal the Earl of Camperdown now makes, for there is no question whether the effect of carrying his motion will or will not be to destroy the bill. The last time it was before us, there was considerable difference of opinion as to whether the result of his motion would be to reject the bill. On that side of the House it was contended that the passing of his motion would not be tantamount to the rejection of the measure. We were of a contrary opinion. But now the noble earl makes a direct motion for the rejection of the bill. That being so, all that your lordships have to consider is, whether the consumer will be in a better position in consequence of the rejection of the bill, or in consequence of passing it. You are told that there is great danger if you sanction the charge of 3s. 9d.—that you will not be able to retreat from that position. But that is a danger to which you are exposed already, for Parliament has sanctioned in the case of this company the charge of 3s. 9d. It is a charge that they are now authorized to make; it is a charge which they are making, and if the bill is not passed will continue to make. But if this bill does pass, there are means provided in it for reducing the charge. In proportion, as the dividend of the company increases in that proportion, the charge will be reduced, and in the opinion of competent persons it is likely that at an early period some reduction of charge will have to be made, and probably a larger reduction than that of 3d., which is the object of the Earl of Camperdown's movement. If the dividend is raised, even to so much as 11 per cent., the charge will be reduced to 3s. 5d., and this will be a larger gain to the consumer than that which is contemplated by him. But supposing the bill does not pass, what condition will you be in then? Do you secure your charge of 3s. 6d.? Not in the least. The company have now the power to charge 3s. 9d. They have no motive for receding from that position. It is the position that Parliament has given them. They will never come to Parliament and ask that the charge shall be reduced. The probability is that any hostile action will force the company to recede from a position in which great advantages are already guaranteed by Parliament. I do not know whether Parliament would consider it within its competency to reduce the charge from 3s. 9d. to a lower figure. I remember very well that in 1860 when this question was before a committee of the House of Commons, of which I was a member, an attempt was made to reduce the dividend, and when the proposition came before the House of Commons it was scouted by the House on both sides, and was held to be an invasion of the rights of property. I believe that the proposal of the Earl of Camperdown would be met in the same way. At all events, the Board of Trade, the Metropolitan Board, and the Corporation of London are in favour of this bill. The gas company would never have attempted to reduce the charge, and I do not know any person or body, excepting only the noble earl himself, who is likely to undertake this task. You are really in this position. Will you accept the almost certain probability of reducing the price of gas on the terms provided in this bill, or will you put the matter off for an indefinite period, condemning the consumer still to pay the price of 3s. 9d., on the chance that the Earl of Camperdown, in his zeal against the gas companies, will some day or other be able to persuade Parliament, in the teeth of the gas companies, to reduce the price which is guaranteed to them? He has referred to the putting off of the other bill by the committee of which Mr. Forster was chairman. I know, from Mr. Forster himself, and indeed it is plain from the statements which are printed here, that he did not express himself in favour of a reduction in the price, even in the south of London, to 3s. 6d. He said it was a question which it was necessary to examine. But even if it were necessary in the case of the southern companies to make a reduction, it does not follow that it is necessary in the case of the companies on the north side of the Thames. Of course the price of gas must depend on the amount of capital expended on the works. The capital invested by the northern companies is of a much larger amount than that invested by the companies in the south, because the area in the north is very much larger. A much greater quantity of mains had to be laid down in the north of London than in the south, and, of course, the expense was much greater. I have here a statement which shows the difference between the outlay of capital by the companies on the north and those on the south of the Thames. On the south of the Thames, for every 100,000 cubic feet of gas they have found it necessary to invest £100 in share and loan capital. On the north it has been necessary to invest £136. It is obvious, therefore, that the charge for gas by the companies north of the Thames should be greater, seeing that the outlay to procure the gas has been so much larger. That disposes of the case in respect of the companies to the south of the Thames. But really they have very little to do with the matter with which you have now to deal, which really amounts to this—whether you will prefer a bird in the hand to one in the bush. Your bird in the hand is the almost certainty that the price will be reduced according to the sliding scale provided in the bill. The bird in the bush is the putting the matter off for an indefinite period, on the chance that the noble earl, by the unaided weight of his own eloquence, may be able to persuade Parliament to do that which Parliament has never done before.

Viscount CARDWELL: On the last occasion when we discussed this question we were not very far from carrying the amendment of the Earl of Camperdown. One of the principal arguments then put forward in the speech of the Marquis of Salisbury was that, if the bill passed, an uniform price with regard to the whole of the Metropolis would be established. He says further, that your lordships must choose between the bird in hand and the one in the bush, and that if you do not take this bill the company may go on charging 3s. 9d. But that statement is most unfair. The company are at present limited to a dividend of 10 per cent., and they are limited also by certain clauses which enable those who are paying 3s. 9d. per 1000 for gas, to go to the Board of Trade and demand an inquiry whether the charge of 3s. 9d. is necessary, with due care and management, to enable the company to pay 10 per cent. Therefore that statement would entirely mislead the House as to the present state of the law on the subject, with regard to this one at least of the companies. Now, what is this bill going to do? My noble friend opposite says that you will probably have a much greater reduction in the price of gas than a reduction from 3s. 9d. to 3s. 6d. He has shown that there has been a greater expense in laying down gas-mains in the north than in the south. But he has failed to tell you that every ten years the consumption of gas doubles itself, and that these expenses therefore bear, as time goes on, a less proportionate part in the cost of production. And it is on the north side that the great augmentation of population takes place, and the great increase of consumption may be expected. Consequently, the real state of the case, as appears to me, is this: you will have, as time goes on, a very great reduction in the price of gas, and, if you let the law alone, the consumer will get the benefit of it. But if you pass this, as I think, improvident arrangement, the result will be that the producer will get the benefit instead of the consumer, and this I think ought not to be the case, seeing that no other gas companies will have that advantage, except these in the Metropolis, who have already got one advantage over all other companies in the country; because, by the Act of 1860, it has practically come about that they have a maximum instead of a minimum, or, in other words, they have a guarantee of 10 per cent., and that is sufficient, without giving them this further advantage. Then comes this great point which the Earl of Camperdown raises. The time will come I hope—though we may not, any of us, live to see it—when there will be some improvement in the municipal administration of this great Metropolis; and then will come the question whether the supply of gas and water shall be in the hands of the public authorities, instead of being, as now, in the hands of private companies; and you will have to purchase out this great company according to the price which they are now seeking by this bill to impose. Nobody has a greater regard for the Board of Trade than I have, but the course which the Board of Trade have pursued, from 1867 to the present time, with regard to this matter, has not been one in the interest of the consumer; and now you are asked to fix the initial price at 3s. 9d., with a power of increasing dividends on diminished price for the whole north of the Metropolis, while you are actually passing another bill of a company whose district is to the south of the Thames, which provides that they shall furnish their customers with gas at the rate of 3s. 6d.

The House then divided on the question "that the bill be now read the third time," when the numbers were—

CONTENTS, 34.

Cairns, Lord (*Lord Chancellor*).	Hutchinson, Viscount (*Earl Donoughmore*).
Richmond, Duke.	Aveland, Lord.
Hertford, Marquis.	Bagot, Lord.
Salisbury, Marquis.	Clonbrock, Lord.
Bradford, Earl.	Colchester, Lord.
Cadogan, Earl.	Colville of Culross, Lord.
Carnarvon, Earl.	De Ros, Lord.
Derby, Earl.	Elphinstone, Lord.
Devon, Earl.	Forbes, Lord.
Jersey, Earl.	Monson, Lord.
Malmesbury, Earl.	Saltoun, Lord.
Nelson, Earl.	Skelmersdale, Lord (*Teller*).
Onslow, Earl.	Sondes, Lord.
Powis, Earl.	Stewart of Garlies, Lord (*Earl Galloway*).
Selkirk, Earl.	
Shrewsbury, Earl.	Vaux of Harrowden, Lord.
Waldegrave, Earl.	Ventry, Lord.
Hawarden, Viscount (*Teller*).	

NOT-CONTENTS, 21.

Bandon, Earl.	Foxford, Lord (*Earl Limerick*).
Camperdown, Earl (*Teller*).	Houghton, Lord.
Dartrey, Earl.	Redesdale, Lord.
Fortescue, Earl (*Teller*).	Romilly, Lord.
Granville, Earl.	Sefton, Lord (*Earl Sefton*).
Harrowby, Earl.	Somerton, Lord (*Earl Normanton*).
Lucan, Earl.	Stanley of Alderley, Lord.
Canterbury, Viscount.	Strafford, Lord (*Viscount Enfield*).
Cardwell, Viscount.	Stratheden and Campbell, Lord.
Abercromby, Lord.	Vernon, Lord.
Foley, Lord.	

Majority for the third reading 13

The bill was therefore read the third time, and passed.

HOUSE OF COMMONS.

MONDAY, JULY 31.

CLEAN RIVERS BILL (Lords).—This bill was read the first time.

BURGHS (SCOTLAND) GAS SUPPLY BILL.—The Lords amendments to this bill were agreed to.

TUESDAY, AUGUST 1.

POLLUTION OF RIVERS BILL.

The order for the consideration of this bill, as amended, having been read,

Dr. LYON PLAYFAIR said that the measure had been brought forward on all its stages at so late an hour that it was not found possible to discuss its provisions. His main objection to the amended bill was that it would tend to the advantage of the manufacturers solely, and that the general public would derive no benefit from its provisions. As at first drawn, the tendency of the measure was in the latter direction, but it had since been so cut about and altered, that all the proposals which could have proved advantageous to the public had been frittered away. Another objection which he had to it was that it would take away all power, in reference to this particular question, from the local authorities, and concentrate it in the central department in London, at the same time giving enormous power to the departmental inspectors without providing that they should possess any chemical or other knowledge of a kind necessary to the due performance of the duties attaching to their offices. The majority of his Scotch friends were favourable to the bill, and the explanation of this was, that while the common law of Scotland provided most strictly for the protection of the public interest in a matter of this kind, the present measure would act most favourably in the interest of the polluters of rivers. He protested against the hasty manner in which the bill had been pressed through Parliament, but would not, at this period of the session, oppose its further progress by moving an amendment of which he had given notice—viz., "That in view of the important interests involved, and the short time given to the country to consider the large changes made by the Government in the bill, it should not be proceeded further with during this session."

Mr. SCLATER-BOOTH said it was true that the Scotch members supported the bill; but it was only just to them to say that their support was given before any of the alterations, said to be so particularly favourable to manufacturers as against the public, had been made in its clauses. He hoped that in the future a good deal of the centralization complained of would be removed. He agreed that it was desirable that the administration of the bill should be placed in the hands of the local authorities; but if it was proposed to do so at first, there would be a great outcry against it. He denied that the amendments, introduced through his agency, would have the effect of destroying the original intention of the measure.

Colonel MURE pointed out that the bill had been for a fortnight on the paper, and no one had given notice of any amendments. If the interests of the public had been in jeopardy, that surely would not have been the case. He hoped, therefore, the bill would be allowed to proceed.

Sir C. DILKE said that those best acquainted with the subject were of opinion that the proper course was that Parliament should pass a Suspensory Bill this year. He therefore moved that the debate be adjourned.

Mr. M'LAREN trusted the House would proceed, as nine-tenths of the public, in addition to the manufacturers, were in favour of the bill.

Sir W. HARCOURT hoped that the honourable member for Chelsea would not press his motion. His right hon. friend (Dr. Playfair) did not persevere with his amendment, not liking to take the responsibility of doing so. What the House ought to consider was, whether the bill was not better than nothing. He recognized the force of what the President of the Local Government Board said the other night—that it was a great thing to get the framework of the bill.

The motion for the adjournment of the debate was withdrawn, and several amendments having been proposed and agreed to, the bill was reported.

FRIDAY, AUG. 4.

The Lords amendments to the Wakefield Water Bill were agreed to.

POLLUTION OF RIVERS BILL.

On the order of the day for the third reading of this bill,

Mr. DILLWYN said the measure now before the House was not that brought in by the Government. He thought the bill as introduced, though not a very strong one, would have done some good. Since then, however, material modifications had been introduced, the effect being that the manufacturing interests, which at first opposed, were now in favour of the bill. He complained of the insertion, without adequate notice, of the 16th clause, by which a manufacturer might continue to pollute a river for three years, without being subject to interdict or injunction, if he had received a certificate from the Local Government Board. He protested against such a clause as perfectly monstrous. He should have been glad if the bill had been recommitted, with a view to the withdrawal of that clause, for the bill on the whole was a good one; but, as the right honourable gentleman who had charge of it would not consent to that suggestion, he was obliged to oppose the third reading. He moved—"That the bill be read a third time this day month."

Mr. ANDERSON supported the bill. The clause to which Mr. Dillwyn referred only enabled a manufacturer, who had procured a certificate from the Local Government Board, to carry on his works for three years, free from injunction and interdict, but still exposed to an action for damages. In other words, the clause only took away the extreme remedy of stopping the works and driving the people out of employment.

Mr. SCLATER-BOOTH, having given a brief history of the progress of the bill in its various stages through the House of Commons, pointed out that the clause which was now objected to had been very carefully considered, and had received the support of many influential members on the Opposition side of the House. It was to the effect that procedure by way of injunction should not be had recourse to during the existence of one of these certificates; but they were not to be granted for more than three years, and only where works of purification were actually in operation; while any person aggrieved might appeal to the governing authorities to cancel the certificate. He looked upon that as a reasonable proposal, and, if it were desirable that the language of it should be reviewed, there could scarcely, he contended, be a better tribunal for the purpose than the House of Lords.

Sir H. JAMES, adverting to the fact that the bill had been on a former occasion, by a slip of the tongue, described by the right honourable gentleman as a measure for the better pollution of rivers, suggested that the description was prophetic of its real character as it now stood; for, in order to secure the passing of the measure the Government had conceded so much that it had become the manufacturers bill instead of the bill originally introduced. If the design was to carry the bill now, and to follow it up with another next year, the better way would be to throw it out at once.

Mr. CROSS doubted whether Sir Henry James had read the bill. If he had, he would scarcely have spoken of it in the terms which he had used. There were three kinds of pollution in rivers—namely, solid refuse, sewage, and the matter which came from manufactures; and for dealing with these evils various bills had, at different times, been introduced. All of them had failed because they attempted too much, and Mr. Sclater-Booth, in view of that fact, had wisely confined his measure within certain limits. No one who visited the north of England could fail to notice that the rivers there were gradually becoming choked up with the solid refuse thrown into them, and the injury thus caused to the people living on their banks was incalculable. In the neighbourhood of some of the large towns in his own county the expense incurred in dredging these rivers was enormous. Now, if the last speaker had made himself acquainted with the clauses relating to that part of the subject, he would have seen that they embodied most important provisions. The bill also dealt completely with that great source of the pollution of rivers arising from sewage; and if there were nothing else in the measure but the means of preventing that great cause of injury to the public health, and also to the cattle feeding on the banks of the rivers, it would be well worth the House's while to pass it. With regard to the pollution produced through manufactories it was a great step to stop, as the bill would do, the further pollution of rivers by manufactories to be hereafter established. With respect to that part of the evil created by existing manufactories, and as to which they had to deal with vested interests, they must proceed in these matters by degrees; and he believed that Mr. Sclater-Booth had gone as far as public opinion enabled him.

Mr. GOSCHEN said it might be true that the bill went as far as public opinion would sanction at that period of the session, but it should be remembered that they had yet had no discussion on that important measure, except at the small hours of the morning, and that if it became law it would have been settled by arrangements made in the lobby. The House could not now pass a bill such as they would wish to pass, and an imperfect measure like the present one would not really facilitate the further work of legislation which would have to be done on this subject. It would be far better to leave the question to be settled in a future session than to deal with only an unimportant part of it.

Mr. LOCKE observed that the argument against the bill seemed to be this, that if Parliament could not now deal with the whole matter it would be better not to touch it. That, however, was not the ordinary rule that human beings adopted. The bill was founded upon this proposition, to go as far as possible in the right direction. There was an opportunity now of setting things right and of giving the people pure water to drink, which he hoped would not be lost.

Mr. C. S. READ said that during the summer and autumn of last year he was engaged in investigating the sewage question. He then found that the rivers of the north of England were polluted to an enormous extent by solid matter put into them, and by sewage. This bill would effectually meet those two points. The pollution of rivers by manufactories with dye was not one quarter so bad as the pollution by sewage. This was the most practicable, useful, and workable measure on the subject yet submitted to Parliament.

Mr. MONK said he would much rather that the bill had been recommitted, for the purpose of striking out the objectionable clauses, than that the bill should be rejected. He hoped the House would not be called upon to divide upon the amendment.

After some further remarks from various members,

Mr. DILLWYN, admitting that the feeling of the House was evidently in favour of the bill, intimated his intention not to press his amendment.

The bill was then read the third time and passed.

HOUSE OF COMMONS COMMITTEE.

TUESDAY, MAY 2.

(*Before Sir* JOHN ST. AUBYN, *Chairman*; *Earl* PERCY, *Mr.* GOURLEY, *and Mr.* JENKINS. *Mr.* A. BONHAM-CARTER, *Referee.*)

HORNCASTLE GAS BILL.

Mr. RICHARDS, Q.C., Mr. PEMBER, Q.C., and Mr. SAUNDERS appeared for the promoters; Serjeant SARGOOD and Mr. MICHAEL for the Horncastle Local Board, opponents of the bill.

Mr. RICHARDS having opened the case on behalf of the promoters, the following evidence was called:—

Mr. *Henry Boulton*, examined by Mr. SAUNDERS.

I am secretary to the Horncastle Gas Company, which was established under a deed of partnership in 1834. I believe the original capital was £3000, subscribed by six partners in the proportion of £500 each. There was a provision in the agreement that in the case of assignment of the shares they were first to be offered to the other parties to the agreement, at the cost price—£500—or one-sixth of the capital, whatever it might be at the time. The works were carried on by the original proprietors down to the end of 1855, during which time money had been spent in enlarging the works, the same being taken out of the profits. Taking the profit from the year, 1834 to 1855, the average was £7 10s. 7d. per cent.; that is upon the £3000. Up to 1856 we had laid out another £3000, a considerable portion of which was expended in the beginning of that year. From 1856 to 1874 our dividends averaged £4 7s. per cent. In addition to the profits we divided, we have spent, during the last 20 years, another £5000 in improving the company's property, making a total of £11,000 altogether, including the original capital. By this expenditure upon the works we have always met the increasing wants of the town in the matter of gas supply; and at the present time we are equal to the demands of a town of a much larger size. The population of Horncastle is now about 5000. The highest price which has been charged for gas was 7s. 6d. In 1860 it was 6s. 8d., but in that year one of our customers was dissatisfied, and said we might cut his gas off; we took him at his word and did so, and he then got up a sort of agitation against the company, and we reduced the price to 5s. 10d., coals having gone down a little. From 1868 to 1872 the price charged was 5s., but in the latter year it was raised to 5s. 10d., at which figure it now stands. At Alford, at the present time, the price is 6s. 8d.; at Boston, 5s.; at Coningsby and Tattershall, 6s. 8s.; at Raseu, 5s. 10d.; at Spilsby, 5s. 10d.; at Spalding, 5s. 10d.; at Sleaford, 5s.; and at Holbeach, 5s. 10d. We pay for railway carriage for our coals 8s. 9d. per ton, in addition to the charge at the pit's mouth, which at present is 12s. 6d.; and it costs us 1s. additional for delivery into the works. The price charged for the public lamps from 1838 to the end of 1874 has averaged only 4s. 6d. per 1000 feet. They are supplied by meter at the present time at 5s. 3d. per 1000 feet, but that is only within the last year. Previously, they were paid for by contract at the rate of £3 per lamp, from which was to be deducted the charge for lighting and cleaning, which amounted to 12s. 6d. per lamp. The price in other parishes varies from 14s. to 19s. The contract for £3 per lamp was made on the assumption that they were burning 5 feet per hour, but since we have had meters put to them we find that they burn 6¼ feet per hour. Our works were constructed before any railway was contemplated for Horncastle. If we had a siding right up to the works there would be only a saving of 6d. a ton; but then there would be the expense of making the siding, and the interest of the money, which would reduce the saving to 4d. Fresh roads are being formed in Horncastle, and we are constantly laying down new mains and pipes. Our solicitor, Mr. Tweed, conducted the correspondence with the local board on the subject of the purchase of the gas-works, but the instructions were given partly by myself and partly by one of the directors. I should remember the letters if I saw them.

Cross-examined by Serjeant SARGOOD: I was not one of the original co-partners; I bought my shares in 1845. Although there are at present nine co-partners, in three instances two are conjointly the representatives of a deceased co-partner. I have been treasurer as well as secretary for the last 20 years; I receive all the money and pay all the accounts.

Serjeant SARGOOD requested to be shown the capital of the company as stated in their original books, and witness produced a book which he called the "book of disbursements."

Mr. PEMBER said the capital account did not exist in the shape applied for. All the company claimed was that £3000 had been subscribed in equal shares and proportions, and that additional sums of money had been subsequently expended by the co-partners, instead of being divided as profits, upon such objects as in a gas company were charged to capital account, and those items appeared in the book produced as "disbursements." In 1856 the company took stock, and said: "During the last 20 years we have spent as nearly as possible £3000 upon matters which should have been carried to capital account; from henceforth we will consider the capital of the company to be £6000." From 1856 to 1875 they had spent £5000 more, and that was how the capital of £11,000 had arisen. He would have the amounts taken out of the book to show that it all had been *bonâ fide* expended, but he could not undertake to show a regular capital account in which as a pre-existing thing those items appeared.

Cross-examination resumed: When certain payments were made they were christened capital, and a small red ink "*c*" placed against them to indicate that, and at the end of the year they were cast up. Other items were ticked in pencil, which showed that the disbursement had been properly vouched by the auditor. We never kept a separate ledger; we found out what we had to divide at the end of the year by our bank-book.

Serjeant SARGOOD: What I understand is, that having started with £3000, that sum had grown, through additional outlays from your current income, to £6000. Show me the next entry, which indicates that the capital had increased beyond that amount.

Witness: There is no other entry yet made. When we applied for our bill the capital account was not closed, because we have spent £100 since; and at the end of June this year, when we meet at the annual meeting, the entry will be made. The statement of "Moneys expended by the Horncastle Gas Company on account of capital" begins in 1856, and comes down to 1874; added up it amounts to £6294, of which £1200 is for renewals, and, therefore, ought not to be called capital.

WEDNESDAY, MAY 3.

Mr. PEMBER said that Serjeant Sargood and himself had agreed that the correspondence, mentioned on the previous day, should be put in, and he would proceed to read it. [The learned counsel then read the various letters which had passed between the local board and the gas company, extending over a period of four months. In the course of the correspondence the gas company expressed their willingness to sell their works, plant, &c., to the local board, the value of the same to be ascertained. The local board, however, contended that they had no power to purchase by arbitration, but that they could do so, with the consent of the Local Government Board under the 162nd section of the Public Health Act, 1875, on terms to be settled between the parties; they, therefore, requested permission for their engineer to inspect the works, which request was declined by the gas company. A letter was also read from Mr. Banks Stanhope, suggesting the following settlement of the question:—"1. One engineer to be chosen by each side, and an umpire to be selected by them, or in the event of failure, by the Board of Trade; their decision to be final. 2. Solicitors, but no counsel, to be employed on either side. 3. No more than three witnesses to attend on either side. 4. All expenses of such arbitration to be borne by each side in equal proportions. 5. The value of the works and interest (the legal term for trade or business) to be estimated at its existing value, as if there had been no bill before Parliament." In answer to those suggestions the gas company sent the following replies, which closed the correspondence:—"1. The Horncastle Gas Company assent to this suggestion, it being in accordance with what they have always proposed—viz., abitration upon the principle laid down in the Lands Clauses Consolidation Act. 2. They think the arbitration should be conducted by counsel, but they have no objection to a limit of one being employed on each side. 3. The limit of witnesses is too small; one or two of the officials must be examined, in addition to evidence as to value; they have no objection to a limit of five. 4. They think the clause as to expenses of arbitration unusual. 5. They cannot see why the matter should be treated by the arbitrators as if there was no bill pending before Parliament when there is one.]

Mr. *Boulton* recalled, and further cross-examined by Serjeant SARGOOD.

In the correspondence, the local board suggested that our works were in a bad condition, whereas they are all new, and I supposed they wished to examine them merely for the sake of opposition. I doubted the *bona fides* of their offer to

purchase, notwithstanding all the correspondence. My idea was that, if they really wished to purchase, the value should be determined by an arbitrator, who might inspect the works and books and everything. I consider that our works are worth much more than they cost. The local board never offered any terms themselves, and we did not consider the offer should come from us.

Serjeant SARGOOD: Was not your object in refusing to let the local board see your works to prevent the chance of their making you an offer and your having the *onus* of refusing it?

Witness: We supposed they wanted to examine them for the purposes of opposition.

Cross-examination continued: At a meeting of the company held on Oct. 21, 1875, it was decided to apply for an Act in the following session of Parliament, it having been decided at a preliminary meeting on Sept. 9 that such a course was desirable. I was not aware in September that the Public Health Act had been passed. If we had known it we should have discussed it. Whether we should have gone on with the bill if we had been aware of that fact is quite another question. I must tell you that several years ago we discussed the question of going to Parliament, but we were not in a position pecuniarily to do it, four of our shares being then under trust with trustees, and they could not advance any money. At the present time our property has become so valuable that we think it better, both in our own interest and in the interest of the consumers, that we should have parliamentary powers. We propose to turn our capital into £10 shares, and let the public invest in them. One reason why we thought it was expedient was, that we have seen that companies have been blamed by Parliament for not putting themselves under parliamentary powers. We are not particularly anxious to sell our shares, but it has often been told us that our company is too small. So far as the progress of the concern is interested, there is nothing that has embarrassed us particularly at present in carrying on our trade and earning our profit. As we now stand we may divide an unlimited profit, but if we put ourselves under statutory powers we cannot. I cannot say what was the consumption of gas in 1856, because the books never came into my possession, the previous clerk having died about that time. We had no station-meter previous to last year, and therefore had no means of knowing exactly how much gas we made and how much we sold. The amount of gas we sold in 1859 was about 2,817,000 cubic feet to private consumers, and for the public lamps 760,000 cubic feet.

Some discussion here took place, in the course of which

Mr. PEMBER said the gas company objected to any action being taken by the local board without their getting their bill, so that they might be able to go on with their works under the general law, in the event of no terms of purchase being arranged.

Serjeant SARGOOD said the local board were willing to deal with the gas company as a non-parliamentary company. He thought a clause might be drawn to enable the local board to buy at a price, to be fixed by arbitration, the same to be of a limited character, so as to guard against needless expense, and the arbitrator to deal with the subject as though this had been a non-parliamentary company.

Mr. PEMBER said he was not prepared to offer any clause of that description.

Cross-examination resumed: In 1859 the sale of gas was 2,817,000 feet to private consumers, and 760,000 feet for public lamps; in 1865, 3,978,000 feet to private consumers, and 800,000 feet for public lamps; in 1870, 6,151,000 feet to private consumers, and 860,000 feet for public lamps; in 1875, 7,057,000 feet to private consumers, and 1,035,000 feet for public lamps. That is for the twelve months ending at Lady-day.

In reply to the chairman, Mr. PEMBER said that in the year ending Christmas, 1875, the gas actually made was 9,437,000 feet, of which the amount actually sold to private persons was 7,583,000 feet; to the public lamps, 1,128,000 feet; and the amount consumed on the works, 150,000 feet; making in all, 8,861,000 cubic feet.

Cross-examination resumed: The £1200 deducted from our capital account was for the renewal of the apparatus which was done away with. The period over which that amount extended would be from 1856 to the present time. During the last ten years, we have purchased new meters and new purifiers. For the meters we put down about £500. The paper on which our calculations were made has been destroyed. A general agitation was got up about the year 1860, and steps were taken to promote a new company; but I do not know that any shares were subscribed for. We offered to sell our works to the new company for £6000; all new materials on the premises to be taken at cost price, and meters, tools, coal, coke, lime, and tar on hand to be taken at a valuation. That company was got up merely to put a pressure upon us. In giving the price at Alford at 6s. 8d., I did not mention that 5 per cent. was allowed for cash in a month, because people have it at their option whether they will pay or not. I do not know the consumption of gas there, but the population is 2881, which is about half that of Horncastle. In my opinion, there is no occasion to take the discount into account, because not half of the people pay promptly. Ours is a fixed price, and we give no discount. I am not aware that the price of 5s. 10d. at Spalding is given to them to allow of their paying off the debt of the purchase-money within a given number of years. I should never have thought they were under such restrictions. The principal portion of our coals are purchased from the Strafford collieries; they allow no discount on the 12s. 6d. Last year we paid 13s. 6d. for the same sort of coals. During the coal famine we were obliged to buy what coals we could, and we bought some nuts at 10s.; but there was no saving in doing so. The greater part of the coke we make is consumed under the furnaces. We do not keep any book showing the quantity of coal we carbonize and the quantity of gas we get from that coal. We know the amount of coal we get in during the year, and we always know what is over. The average make of gas is 9300 feet from a ton of coal. We arrive at that by weighing the coals from time to time into the retorts, but we keep no record of those weighings. We generally get about 12 cwt. of coke from a ton of coal, but we do not keep any account of it, because we use the greater part ourselves. We sell some, but I do not know what per centage. I should think we use about two-thirds ourselves. We sell it out by very small quantities, and charge 1s. per cwt. for it.

Re-examined by Mr. PEMBER: Our company have been managed in a sort of rough-and-ready way up to the present time, but by our bill we incorporate the Gas-Works Clauses Act, and all the forms for accounts, and so on, will now fall upon us. For some time past we have used screened coal, which, although more expensive, proved the cheaper. As to our refusal to allow the engineer of the local board to go over our works, we were not going to permit that so long as they were opponents to our bill, but if there were to be an arbitration, both the arbitrators and engineers on each side would inspect our works, and we should give them all the information they required. One ground for our application to Parliament is that we cannot raise capital without, for an increase of our works. We have been in the habit of paying ready money for everything, and, therefore, our bankers book was a pretty fair guide to the amount of money at our disposal at the end of the year.

By the COMMITTEE: Of the capital now invested in the works the present shareholders have never subscribed any money over and above the £3000, but they have gone without dividends. The local board did not ask for permission to inspect our works until after we had announced our intention of applying for a bill.

Mr. *Charles Dixon*, examined by Mr. PEMBER.

I am the manager of the Horncastle Gas-Works, which are in very good condition. We have sufficient plant to last for many years. The amount of gas made in 1875 was, in round numbers, 9,437,000 cubic feet. We sold to private consumers 7,582,900 cubic feet; for the public lamps, 1,128,000 cubic feet; the shareholders consumption (of whom there are two who burn gas) and the consumption on the premises amounted to 150,000 feet; the whole amounting to 8,861,000 cubic feet, leaving a loss by waste of 576,100 cubic feet, which is at the rate of about 7 per cent. I test the gas by Sugg's Argand burner, and consider it to be very good. We had no complaints respecting the quantity of the gas until the local board decided to oppose the bill we are now applying for, and, in my opinion, those complaints when made, were not well founded. The mains have been relaid at different periods since I went to Horncastle. The total amount received for gas in 1871 was £1438 10s. 6d.; in 1872, £1557 4s.; in 1873, £1877 5s. 7d.; in 1874, £2087 5s. 1d.; and in 1875, £2058 5s. 3d. The year 1874 has three weeks extra consumption charged in it which properly belong to 1875, the meters not being taken till the third week in January, owing to the illness of the manager; consequently there is over £100 charged which properly belongs to the next year.

Cross-examined by Mr. MICHAEL: Those figures do not include the amount received for the public lighting, for which we were paid £141 for the half year ending Midsummer, 1875. The quantity of coals used last year was 1015 tons, giving an average of 9300 feet per ton. We have 24 retorts, 14 being the greatest number we have had in use on any one day. The greatest quantity of gas we made in 24 hours last winter was 52,000 cubic feet. The retort-house has been rebuilt since I have been with the company, and new purifiers have been erected; in fact, the whole works have been renewed, with the exception of one shed. We have three gasholders, giving a total storeage of 57,000 feet. Our largest main leading from the works is 6 inches in diameter. Our works are about 13 feet above the mean level of the town. The pressure we employ after six o'clock in the evening is about 20-10ths, and in the daytime about 10-10ths. The total length of our mains is about 7000 yards, I should think.

Mr. *Robert Clifton Armstrong*, examined by Mr. RICHARDS.

I am a brewer, maltster, and wine merchant at Horncastle, and have lived in the town since 1832. I was a member of the local board from their formation in 1862 up to 1875, when I retired. I am quite satisfied with the quality of the gas supplied by the Horncastle Gas Company, and have never found any deficiency in quantity. If there has been any deficiency, it is in consequence of bad burners being used. I do not remember any smell or nuisance arising from the gas-works.

Cross-examined by Mr. MICHAEL: I may have made complaints about the supply to my own house, but I should imagine the fault was all owing to the burners. I do not know who had the regulation of the burners.

Mr. *Henry Lunn*, examined by Mr. RICHARDS.

I am a wholesale grocer, &c., in Horncastle, and have lived there for 35 years. I am a large consumer, and am perfectly satisfied with the supply of gas. I have not made a complaint since my new premises were erected in 1864. Prior to that time I had corroded pipes; but now that I have good pipes, I never have to find fault. I am secretary of a large school close to the gas-works, and I have never heard a complaint there of any nuisance. In my opinion, it is desirable the works should remain in the hands of the company.

Cross-examined by Mr. MICHAEL: I have never stated at a public meeting that I thought the gas undertaking ought to be in the hands of the local authority.

By the COMMITTEE: I do not think from the administration of our local board that they would do so well with the gas-works as the company would do for them.

THURSDAY, MAY 4.

The CHAIRMAN said the committee would like to know whether the parties were agreed, or whether they had any opinion as to the power of the local board to acquire or purchase the undertaking of the gas company under sections 161 and 162 of the Public Health Act of last year.

Mr. RICHARDS said he understood that by the Public Health Act the local board had no power whatever to purchase the undertaking until they had obtained a Provisional Order.

Mr. MICHAEL said that if his learned friend would read the terms of the section, he would find it was not so.

Mr. RICHARDS said the clause was as follows:—"For the purpose of supplying gas within their district or any part thereof, either for public or private purposes, any urban authority may (with the sanction of the Local Government Board) buy, and the directors of any gas company in pursuance, in the case of a company registered under the Companies Clauses Act, 1862, of a special resolution of the members passed in manner provided by that Act, and in the case of any other company, of a resolution passed by a majority of three-fourths in number and value of the members present, either personally or by proxy, at a meeting specially convened, with notice of the business to be transacted, may sell and transfer to such authority, on such terms as may be agreed on between such authority and the company, all the rights, powers, and privileges, and all or any of the lands, premises, works, and other property of the company, but subject to all liabilities attached to the same at the time of such purchase."

Mr. MICHAEL said that, according to the interpretation clause, "company" meant any company or person carrying on the undertaking for their or his own profit.

Mr. RICHARDS said his clients considered themselves as coming under the words, "any other company."

Mr. JENKINS said the committee wished to know whether the local board believed that, under the 161st and 162nd sections of the Public Health Act, they had power to purchase the property from the Horncastle Gas Company, or whether they must obtain a Provisional Order to do it.

Mr. MICHAEL said they did not require a Provisional Order. What was necessary was to have the consent of the Local Government Board; and the object of that was that no money could be borrowed for permanent works without the consent of that Board. In the case of an incorporated company, there was no power for a local board to supply gas of their own, or to supply private consumers. But there was another point—"company" comprehended a company or a person, and a single person, having established a gas-work, might be bought up by the local authorities with the permission of the Local Government Board.

Mr. JENKINS: Then you are clear that, supposing we were to throw out this bill, you would, without coming to Parliament, have power to purchase?

Mr. MICHAEL said that was so; but then it would be necessary to obtain a Provisional Order, because, although they had the roads, and all the powers, as surveyors of highways, to deal with the roads, the Legislature had expressly said that, before undertaking to supply gas for private purposes, a Provisional Order must be obtained. If the committee gave permission, it would override that; but supposing no bill were passed, then the local board could purchase the undertaking if they could get the consent of the Local Government Board for that purpose. They would, as a matter of course—because there would be no one to oppose it—get a Provisional Order.

Mr. RICHARDS: We should oppose you on a Provisional Order.

Mr. MICHAEL said he was supposing that the interest of the company had been antecedently purchased. If the local board had known beforehand that the company were coming to Parliament, they might have applied for a Provisional Order, which would have run concurrently with the present bill. If the present bill passed, the local board could not establish gas-works of their own.

Mr. RICHARDS said that he could not find in the interpretation clause that "company" meant person, although he found that "person" meant company. In the 161st section, the words "company or person" were used as if the Legislature did not think that "company" and "person" were identical.

The CHAIRMAN said it was a case of construction that the committee could not settle; it would have to go to a court of law eventually.

Mr. *William Preston Carlton*, examined by Mr. RICHARDS.

I am a chemist and druggist, living at Horncastle, and am a large consumer of gas, with the quantity and quality of which I am perfectly satisfied.

Mr. *Alfred Woodroffe*, examined by Mr. RICHARDS.

I am engaged in the management of a gas-fitter's business at Horncastle, and have taken some little scientific interest in the question of gas-burners. The kind of burner a person should use varies somewhat with the quality of the gas to be burned. In 1870, I made several experiments for ascertaining the illuminating power of the Horncastle gas, with a view of seeing the pipe or burner best adapted for it. The deductions I drew from those experiments were, that the gas was equal to 18-candle gas, and I supplied my customers, as far as I could, with burners calculated upon that basis.

By the REFEREE: I tried a variety of burners, but I did not try Sugg's.

Cross-examined by Mr. MICHAEL: The photometer was situated on my premises, and was a modification of Bunsen's photometer. A jet burner was used as the standard, but my paper does not show the actual consumption of the standard burner. I was told, by the people who supplied that photometer, the standard, which was 5 cubic feet per hour. I made considerably over 100 experiments, extending over fully 14 days. For each burner I made at least 10 experiments, and I tried about 10 burners. I did not take any note of the barometer during those experiments, but I did of the thermometer. In some cases the temperature would be about 53°; in others 53°, 55°, 56°, 63°, and 65°.

Mr. MICHAEL: What do you consider the value of your tests—how could you reduce it into candles?

Witness: Taking the consumption for the time being, and the effect given off in comparison with the five feet per hour taken as the standard by the Act of Parliament. I had no candle burning in order to estimate what was the absolute amount in candles. It was merely burner against burner, but the test-burner was known to be equal to a certain number of candles. The jet which I used as a standard I cannot put in grains of sperm.

Mr. MICHAEL: What do you mean by "standard"?

Witness: The standard with which the burner I was testing was compared.

Mr. MICHAEL you were merely testing burner against burner with the same gas?

Witness: But the burner is common to all the experiments. The result of the experiment will tell the quality of the gas for that particular burner.

Mr. MICHAEL: Do you not see that your test is entirely inefficient unless you have the absolute standard of candles by a photometer first ascertained with that particular gas?

Witness: I was not testing with a sperm candle.

Mr. MICHAEL: You had not the absolute standard to begin with; you had merely the quality of burner against burner?

Witness: Yes; comparing the effect of the gas upon each.

Re-examined by Mr. RICHARDS: In consequence of those experiments, I purchased for my customers pipes and burners of a certain character, and found them to be perfectly satisfactory.

Mr. *James Baynes*, examined by Mr. RICHARDS.

I am an analytical chemist, living at Hull, and examine the gas of the British Gas Company at their Hull station. I visited the works of the Horncastle Gas Company, without any special notice, on March 31, and April 1, 18, and 19. On the first occasion, the tests were taken without regard to the sperm candles, as I thought they had the weighing apparatus. On March 31, I found the gas to be 18 and 18·2 candles; on April 1, 18·25 and 18·42; on April 18, 18·03 and 18·09; and on April 19, 18·03 and 18·28. On the latter occasion, I took the balance and the necessary apparatus for estimating the amount of sperm consumed. I also took a special meter. I burned 5 feet an hour against 120 grains per hour of sperm candles. The gas was free from sulphuretted hydrogen, and the sulphur very low. I consider the Horncastle works to be in good order, with the exception that they require washing power. Measured by the eye, I should think the public lamps were consuming 6 feet per hour. In some instances, I found the public lamps to be much farther apart than I thought they should be. They ought to be about 60 yards apart, and some of them ranged up to 80, or more than that. I went into two or three shops, and found the lights burning pretty well, except where they evidently had no regard to the burner which they used. In one chemist's shop, I noticed they were using opal shades, which obstruct about 40 per cent. of light.

Cross-examined by Mr. MICHAEL: The ammonia is in excess, in consequence of not having sufficient scrubbing power. On April 1 there was ammonia to the extent of 13·60 grains per 100 cubic feet. On April 19, after they had scrubbed a little, the ammonia was 9·7 grains.

Mr. *G. W. Stevenson*, examined by Mr. RICHARDS.

I have had a great deal of experience during the last 30 years in connexion with gas-works. I have visited Horncastle, and have gone into the structural valuation of the gas-works there. Those works are as well situated as works built at that period could be. They are situated near a canal; but at the time of their construction there was no railway in existence. The whole of Horncastle is within, I should suppose, about 15 feet of the same level, and the works are about 13 feet above the level of the railway. The works are well designed, and substantially built; in fact, they are now works of the most modern construction, containing within themselves all the very best appliances for making gas in the most economical and efficient manner. Some parts of the works are large, in anticipation of future requirements. The scrubbers require to be lengthened out effectually, in order to get rid of the ammonia, and the original gasholder requires renewing; but, with those exceptions, the works are in a thoroughly good condition, and equal to new. I put the value of £800 upon the land, of which there is nearly an acre. The buildings I put at £3830; the plant and apparatus upon the works, £4940; mains, services, meters, and so on, £3732; and the value of the stock-in-trade at about £400; making £13,702, altogether. I then take the usual engineer's commission upon the building, plant, and distribution, which amounts to £532, making a total of £14,234 as the present structural value of the undertaking; but when the works were built, materials and labour were cheaper than they are now, and therefore there is less outlay to show for the works which they have. The £11,000 mentioned in the preamble represents a larger sum at the present time. In the position in which the partnerships were, they supplied gas, and charged whatever the consumers could pay them. If they had pleased, they could have put all the profits into their pockets. Instead of doing that, they laid them aside for a time and expended them in plant; which I consider was doing the right thing in the wrong way. The proper thing would have been to have subscribed additional capital, and to have taken their dividend upon the capital so subscribed and expended. In my judgment, the concern has been very economically worked. The make of gas per ton of coal last year was 9300 feet, which is a very creditable result for the illuminating power which they give. They might have made considerably more gas, but it would have been of a poorer quality. I think some of their mains are too small, and ought to be renewed with enlarged ones; but still the condition of their distributing apparatus is good, because the unaccounted-for gas is only 6·10 per cent. I do not know any company, on so small a scale, working so well as the Horncastle Gas Company. The average of the London gas companies, I think, is 9 per cent.; it has been very much reduced of late years. The average cost of coal last year was 22s. per ton at the railway, and for hauling and trimming, 1s. 3d.; but then the company got back, by the sale of residuals, 9s. 3d. per ton, leaving the cost of the raw material at 14s. To that must be added the cost of manufacture, management, repairs, taxes, and all other expenses, amounting to another 14s., making the total cost 28s. per ton of coal. Dividing the 28s. by the quantity sold, as given by the secretary—viz., 8653 feet—it works out at 3s. 3d. per 1000 feet, which is the cost price, delivered at the consumers meters. Then there is a capital of £3000, upon which a dividend of 10 per cent. has to be paid, which amounts to £300, and 5 per cent. upon the improvement capital of £8000, which is £400—making £700, or 1s. 5d. per 1000 feet. Then there are other expenses, including the cost of the Act, which, with so much opposition, will be, I am afraid, more than I have set down. I have £1500 down for the purpose, and £700 (which is rather a small sum) for working capital—making, together, £2200. I have taken 7 per cent. upon that amount, which is £154, and it works out to 4d. per 1000 feet. Then we want quite £1500 expended upon the enlargement of the mains; the 2-inch and 1½-inch mains ought to be done away with. I have not taken any account of the scrubbers; but I have taken £1500 as being enough to put the works of distribution into first-rate order. Then they are entitled to a reserve-fund—which they have not now—and I have assumed that they will take ten years to accumulate it. I have, therefore, taken one per cent. on a capital of £14,700 towards making up the reserved fund required by the Gas-Works Clauses Act of 1847, and that is 4d. per 1000 feet. That brings the amount up to 5s. 7d. per 1000 feet, and that is taking last year's cost of coal, which was pretty nearly the normal condition of things. There ought also to be an allowance made for contingencies, and I have put that down at 3d. Whether that sum is enough, it is for the committee to determine; but I think if 5s. 10d. were put as the maximum price in the Act, in place of the 6s. 3d. which the proprietors have inserted in the bill, it would be sufficient for the company; and I am quite sure, comparing this town with others of something like the same magnitude and conditions, that it would be just to the consumers. When I talk of a maximum price, I mean a price which can never be exceeded, whatever the price of coal may happen to be; but it does not at all follow that the company should charge the maximum price. I have been told that, but for the opposition, the price would have been reduced last Christmas. Should the company obtain their Act, they will, of course, be placed under restrictions as to illuminating power, pressure, purity, and so forth; which will be a very great advantage to the consumer.

Cross-examined by Mr. MICHAEL: The company deliver gas at an initial pressure of 20-10ths at night, and in the day at 10-10ths, which is not particularly excessive, although it is, perhaps, a little more than they ought to maintain if they had large leading mains. The consumption of gas has increased one million feet in five years. The smallest amount per million feet at which gas can be made depends upon the size of the works. The cost of a million feet increases in an inverse ratio. The smallest amount for which works can be constructed to supply eight million feet would work out to 24s. 9d. per 1000 feet. I never constructed works so small as this, but I know that small gas-works cost more per million than those of larger size. In works of from 50 million to 100 million feet per year £500 a million will, under ordinary circumstances, build the works; but more frequently it is £750 per million feet. Supposing the works to be smaller I should reckon more; I should put it at considerably above £1000 per million for a works of eight million feet per year. The cost of the Horncastle Gas-Works is about £1500 per million feet of gas made, but they are much in excess of present requirements. The retort-house is capable of receiving double the number of retorts which it now contains, but in my figures are not included the retorts which are not constructed. The old gasholder which is now out of use is not worth anything, except as old iron.

Mr. MICHAEL: What is the plan which you usually adopt when you replace old gas-works by new ones—to what account do you charge that replacement?

Witness: Companies do not often consult engineers about that, but my plan would certainly be to charge to capital the difference between the value of the disused plant and the value of the new plant. I should charge that to capital, and the rest I should charge to revenue.

Mr. MICHAEL: In a town of the size of Horncastle what do you put down for the cost of works as the general price per head?

Witness: Years ago I used to calculate it at per head, but I have found it vary very much. In some places the consumption per head of the population is very small, and in others it is very large. It is much fairer to take the cost of works at the largest daily consumption to be obtained from them. In estimating the value of gas-works I do not take the structural value. I ascertain the net annual profit, and, in the case of a non-statutable company, capitalize that net annual profit at 16⅔ years, and, in the case of a statutable company, at 20 years; the fact of having an Act of Parliament thus adds 3⅓ years purchase to the value. The 20 years has been superseded by 24 years a good deal lately. The reason for the difference in value between a company with an Act of Parliament and a company without an Act is that, in the latter case, the business is only carried on on sufferance—the company are liable to be indicted for trespass by any owner of property through which the mains are laid. They are also liable to be indicted as a nuisance for opening the roads.

Mr. MICHAEL: The Horncastle gas partnership, therefore, have been favoured by not having had any proceedings taken against them up to the present time?

Witness: Yes; but having expended all the money they have done, and having all this property at stake, they are thoroughly justified in coming to Parliament. I am not aware that the fact of obtaining an Act of Parliament enables a gas company to set a local board at defiance. It excludes the local board from setting up gas-works of their own, either for public or private purposes; but it is perfectly well known that, under the Gas-Works Clauses Act of 1871, any question arising between the local authority and a statutable company, as to the terms on which the public lighting shall be done, must be referred to arbitration.

Re-examined by Mr. RICHARDS: This company are doing precisely what the Lincoln Company did a few years ago, in getting their paid-up capital settled at 10 per cent., and their profits, called an improvement fund, at 5 per cent. In the original framing of the present bill, the promoters asked for the capitalization of £8000 at 7 per cent.; but when they went before Lord Redesdale that was immediately struck out, according to what may be called the statutory rule, and 5 per cent. inserted. I think the capital asked for in the bill is a very reasonable amount. A little company like this ought not to be brought to Parliament every few years; it is a very great tax upon them and upon the consumers.

Mr. RICHARDS: When capital is expended upon gas-works which in the course of years become completely worn out and have to be renewed, you do not call the original expenditure destroyed, do you?

Witness: No; it remains as capital; and although some portion of it has been used up, some other portion will remain in the shape of the foundations and the permanent parts of the building. In the case of the Chartered Company, they have erected entirely new works down the Thames, and they have abolished their works at Blackfriars, at Curtain Road, and at Westminster, yet the capital invested in those works has not been, and cannot be, written off. It has been expended and used for the service of the public, and it is entitled to dividend now as much as in the case of any other company.

By the COMMITTEE: In arriving at the distributing value, I did not open the ground and examine any of the pipes. A schedule of the sizes and lengths was handed to me, and I priced them out. I valued them at something less than they would cost new. There is an amount of depreciation with regard to the distributing plant which requires to be allowed for. We take the life of main pipes at 70 years; but the life of services I take at only 15 years, and of meters at 20 years.

Mr. RICHARDS said that concluded the case on the part of the promoters.

Serjeant SARGOOD having addressed the committee on behalf of the opponents of the bill, the room was cleared. On the parties being called in,

Mr. RICHARDS asked for a further adjournment for a short time, as he believed they were on the verge of a settlement which would be agreeable to all parties.

After a short interval,

Mr. MICHAEL said: The terms we have agreed upon are as follows:—That we shall take over the bill from this time, paying the promoters £800 for costs incurred in promoting the bill up to the present time, we having the conduct of the bill in future from to-day through this House, and also through the other House; and also that we shall pay them 16⅔ years purchase of the divisible pro-

fits, calculated up to the year ending 1875—that is for the divisible profits. They divided £540—perhaps they might have divided more—but, whatever was the sum really divisible for the year as profits, we agree to give 16¾ years purchase of that sum.

Mr. RICHARDS said he did not like the word "divisible."

Mr. MICHAEL: What word could be used except the word "divisible," which means all the profits earned.

Serjeant SARGOOD: What profit is there but that which is capable of being divided?

Mr. MICHAEL: We have gone upon the common basis of what is called the Enniskillen clause—a clause of two years ago. Then we have agreed to this—that any difficulty arising in the settlement of the matter is to be left to Mr. Spice, who acts for the local board, and Mr. Stevenson, who acts for the gas company, with power to call in an umpire. There is to be no arbitration, but they are to settle the difference.

The CHAIRMAN said that arrangement met with the approval of the committee.

Mr. MICHAEL: Then, in accordance with the terms of the notice, we shall be enabled to insert all the necessary powers for us to conduct the bill as the local board; and as to the borrowing of money and so on, we can bring up clauses for consideration on Monday.

The REFEREE: You will have to come for additional provisions.

Mr. MICHAEL: I think you will find the notice covers the whole of the powers which it is necessary for us to take.

Mr. RICHARDS: How and when is the money to be paid?

Mr. MICHAEL: We will provide for all that.

TUESDAY, MAY 30.

This bill, which was adjourned on the decision of the committee enabling the local board to take over the works, came up for final consideration to-day.

Mr. SAUNDERS, for the company, said the first question in dispute was whether the arbitration should be under the Lands Clauses Consolidation Act or not. A clause had been forwarded to the company by the local board, providing that this course should be adopted, and this was understood to have been acquiesced in up till that morning by both parties, when a change of front was made by the local board. It was now proposed by the board that both parties should defray their own costs of determining any question by arbitration, and each one-half of the umpire's charges. The terms of 16¾ years purchase was a very small amount, and was accepted by the company under the conviction that arbitration would, as a matter of course, take place under the Lands Clauses Consolidation Act. Besides, the company were the vendors, and the ordinary course was that the purchaser paid the vendors costs. The other point was whether, in default of the local board to complete the purchase by September, the latter should pay 6 per cent. or 5 per cent. interest.

On both points the committee decided in favour of the company.

The committee then went through the remaining clauses, and, with a few amendments, passed the bill, which was ordered to be reported to the House.

Legal Intelligence.

WARWICK SUMMER ASSIZES.—THURSDAY, AUG. 3.

(*Before Justice* FIELD.)

PENALTIES SET OFF AGAINST DIVIDENDS.

TAMWORTH GAS COMPANY *v.* THE MAYOR AND CORPORATION OF TAMWORTH.

This action was tried by the learned judge without a jury. The claim was for £25, money due.

Mr. MELLOR, Q.C., and Mr. COLMORE were for the plaintiffs; and Mr. DUGDALE and Mr. GRIFFITHS for the defendants.

From the statement of counsel it seemed that, so far back as the year 1839, a number of shares in the gas company were purchased by subscription, and invested in trust for the general purposes of the town. These eventually became the property of the corporation. Agreements were, at various dates, entered into between the company and the corporation for the lighting of the town, and these set forth that the latter should be liable for various penalties. In 1873 and 1874 the company charged £25 as penalties, and this sum the corporation decided not to pay. The company then sent in an account amounting to £30 0s. 3d., including the £25 charged for penalties, and credited against this sum £30, the dividend then due on the shares belonging to the corporation.

Mr. DUGDALE argued that the £30 dividends were due to the corporation, to be applied to such purpose as they thought fitting, and that the plaintiffs had not any right to charge the amount against their claim.

His LORDSHIP was of a different opinion, and gave a verdict for the plaintiffs for the full amount, with costs.

MARYLEBONE POLICE COURT.—THURSDAY, AUGUST 3.

(*Before Mr.* JOHN S. MANSFIELD, *Magistrate.*)

CHARGE OF STEALING GAS.

William Rowley, of No. 10, Olive Place, Kentish Town Road, on remand on other charges of larceny, was now brought up on a charge of stealing a quantity of gas, the property of The Gaslight and Coke Company. The prisoner was defended by Mr. Sampson.

Mr. WILLOUGHBY, of the firm of Willoughby and Cox, Solicitors, Clifford's Inn, who appeared to prosecute, said the prisoner was the occupier of a private house at the above address, and was supplied with gas by The Gaslight and Coke Company—formerly by the Imperial Company—and, as usual, that supply was furnished through a meter fixed on the premises. By means of a model, which had been prepared for the purpose, he explained the position of the company's main and service-pipes in relation to the prisoner's house. The premises, which had no basement story, consisted of two parts—one the dwelling-house itself, and the other a workshop, &c., in the rear. The charge against the prisoner was that he had made, or availed himself of, an excavation underneath the flooring of his house, and had therein fixed two pipes communicating with the company's service before it reached the meter, by means of which he carried the gas round the meter, and so supplied his premises. One of these pipes was conducted to the workshop in the rear; the other was led up the passage wall until it joined the ordinary house fittings. But just before it reached them there was a sliding door in the panelling, behind which this pipe was carried, and inside that the pipe was furnished with a tap, so that any one acquainted with the system was able to shut off or turn on the surreptitious supply at will. The prisoner had been suspected by the company for some considerable time; and the opportunity having occurred, a meter was placed in the road in such a position that all the gas which went into the house must pass through it. This was done without the prisoner's knowledge. That meter had been in operation about a month, and the result was to show that the actual quantity of gas passing into the house between the 24th June and 31st July was 4380 feet; whereas the register of the house meter, during the same period, upon which the prisoner would pay, showed a consumption of only 700 feet, or not quite one-sixth of the quantity delivered. It was not necessary to argue that gas was the subject of larceny.

The MAGISTRATE: There is no question about that.

Mr. WILLOUGHBY: The gas company might have summoned the prisoner for penalties; but they have instructed me to treat the matter as a larceny, and not to ask for penalties.

The following evidence was then called:—

Mr. *T. W. Selby* said, I reside at 170, Camden Street, and am an inspector of The Gaslight and Coke Company. I do not know the prisoner personally, but I know that a person of the name of William Rowley occupies the house, No. 10, Olive Place. On July 29 I went to that house, from information I had received, to see if there was an illegal supply of gas. I was accompanied by Detective Sergeant Martin, Detective Sergeant Lucas, and Detective Sergeant Allcock. Our visit was paid about ten or half-past ten at night, and directly we got inside the house I noticed that the gas was burning in the passage, and I turned off the main tap—that is the tap which allows the gas to pass to the meter from the company's service. The effect of doing so would be to stop the supply to the meter, so that in the ordinary state of things the house would have been immediately in darkness. It did not, however, have that effect, and I then ordered a gas-fitter, who was present, to disconnect the service-pipe from the meter. The lights still continued to burn. One of the detectives then lit up the remaining burners on the premises—they were not all lighted when we arrived. Another officer having discovered a tap concealed behind a sliding panel in another part of the passage, turned it off, and all the lights were then immediately extinguished. The prisoner was not present at the time. I went to the premises again on Monday morning, and took two service-layers with me, together with Inspector Harris and Detective Sergeant Martin. We looked all over the house, and found a small door in the lower part of the passage wall of the back parlour. We also found an excavation, sufficiently large to allow us to crawl through, under both the front and back parlours. There we discovered a 3-8th inch iron pipe drilled into the service-pipe of the company just where that pipe bends up into the house, and before it reaches the meter. The iron pipe so inserted led underneath the flooring for some distance, and then divided; one portion appeared to be carried round so as to supply the back premises—the workshop and shed, or closet. The other branch went under the flooring to the corner of the front parlour, and was then bent upso as to pass into the passage to the sliding panel, where it joined the ordinary fittings from the outlet of the meter. Gas could pass through both those branches without going through the meter, and we know it did so pass, because when the tap in the passage was turned off after the ordinary service was disconnected all the lights went out. In the front parlour there was beneath the carpet a small hole bored in the flooring. In this hole was a tap, connected with one of the branches of the iron pipe referred to, which tap could be reached and turned on and off with a long key. The gas company have for some time had reason to suspect the occupant of this house of taking gas in a surreptitious way, and had adopted means to ascertain the quantity that passed into the premises; and I have here a statement which shows that from the 24th of June to the 31st of July the actual quantity was 4380 feet, while the quantity registered by the house meter was only 700 feet, so that the company would not be paid for 3680 feet. The value of that quantity of gas is about 18s. 6d. We took account of what burners there were in the house. There were three in the workshop; one in the shed outside; one in the closet, which was stopped up and could not be lighted; one gas-stove, consisting of a ring of jets; and one light in the outer kitchen; one burner in the kitchen itself; one in the hall, one in the back parlour; three in the front parlour; and two on the first floor.

Mr. *D. Dixon*, a gas-fitter, of 182, Kentish Town Road, said: On the 29th of July I went to No. 10, Olive Place, shortly before eleven o'clock p.m. with Mr. Selby, the last witness. I disconnected the union above the main-tap, just inside the door. No gas could then pass through the meter. The burners, however, remained alight in the house just the same as before. I saw a tap behind a sliding door in the passage; when that was turned off all the lights in the premises went out immediately.

Mr. *Selby* recalled, said, in answer to the magistrate, that gas could pass through the prisoner's meter as well as through the pipe surreptitiously laid, provided the main-tap was turned on.

Detective Sergeant *Martin* (G Division): I know the prisoner. He has to my knowledge resided at 10, Olive Place for three or four years. I have heard and agree in the correctness of the evidence of previous witnesses.

Cross-examined by Mr. SAMPSON: I have never myself had any charge against the prisoner before. I never was at his house, but I have seen him go in and out there frequently. He has been suspected of different larcenies. I know that he works for Messrs. Bass.

Detective Sergeant *Lucas* corroborated the evidence already given, and added that after the surreptitious service-pipe was discovered, and the ordinary service-pipe disconnected, he lighted the gas at two burners in the workshop and the gas-stove. He also lighted the burner in the passage. When Detective Martin turned off the tap which was discovered in the panel all the lights went out.

Cross-examined by Mr. SAMPSON: I examined the taps and pipes discovered by Martin. They appeared to be bright and clean.

Detective Sergeant *Allcock* said he went on Thursday, the 27th, at noon, to 10, Olive Place, and apprehended the prisoner on another charge. The gas was then burning in the stove, and the prisoner was heating two flat-irons with it.

Cross-examined by Mr. SAMPSON: I have made inquiries about the prisoner. He has worked for a number of years for Messrs. Bass. I cannot say that I found he bore the character of an honest and respectable man before these unfortunate charges.

The MAGISTRATE intimated that he must have some further evidence to prove the occupancy of the house by the prisoner, and also proof that he was aware of the existence of the surreptitious fittings. Otherwise it might be urged at the trial that the predecessor of the prisoner had fitted up the premises in that way, and the prisoner innocently believed he was burning gas in the ordinary way.

The case was therefore remanded.

SATURDAY, AUG. 5.

The prisoner was again brought up for examination.

Mr. *Selby* recalled and cross-examined by Mr. SAMPSON: When I went to the premises in Olive Place there was no impediment to my searching the house. The original service-pipe belonging to the company has been down more than eight years. The surreptitious pipe was evidently not put down yesterday; it might have been there four or five years—i.e., the pipe, but not the taps. One of the taps had not been turned on for some time, and, judging from its appearance, I should say it had been there four or five years. My duty is to take a record of the consumption of gas.

Mr. WILLOUGHBY: I intended to prove the consumption, and will do so now. (To witness): You have, I believe, a statement, which it is a part of your duty to keep, showing the consumption of gas at 10, Olive Place. What is that book?

Witness: It is the Meter Return Book, and shows the consumption of gas at that house for the past six years, and one quarter of 1869. Our agreement to supply the prisoner with gas is dated Oct. 1, 1869. The consumption for the quarter ending December 29, was 5100 feet. In the corresponding quarter of 1870 it was 1200 feet; at December, 1871, it was 1600 feet; 1872, 1800 feet; 1873, 4000 feet; 1874, 6400 feet, and in 1875, 4600 feet. In 1874 the meter was changed. For the March quarter, 1870, the consumption was 5400 feet; 1871, 3200 feet; 1872, 2100 feet; 1873, 1600 feet; 1874, 2000 feet; 1875, 4600 feet, and 1876, 7000 feet. I have evidence, but am not prepared to state of my own knowledge, that additional lights have been put up during the prisoner's term.

By Mr. SAMPSON: I am an inspector of meters. Meters will vary occasionally and do get out of order.

Mr. *Henry Hill:* I am a store clerk at Messrs. Bass's, and live at Burton House, King's Road, St. Pancras. The prisoner has been employed by Messrs. Bass up to the time he was apprehended. I have had many opportunities of seeing him write, and am acquainted with his signature. The name "William Rowley" at the bottom of the document produced (the gas contract) is, in my judgment, in the handwriting of the prisoner.

Cross-examined by Mr. SAMPSON: I have known the prisoner about eight years. I have only come here to prove his signature. I make no charge of dishonesty against him.

Mr. WILLOUGHBY: The gas contract put in is for a supply to three lights only, and it is in evidence that when the premises were examined there were fourteen lights.

Mr. *G. Cooper:* I am a gas-fitter, residing at No. 3, Marquis Terrace, St. Paul's Road. I knew the prisoner five or six months ago, and did some work for him at his house in Olive Place. I connected a gas-stove in his fire-place with the service-pipe. I did not add any burners.

By Mr. SAMPSON: I have known the prisoner four or five years. I know that he has a workshop at the back of his house, and does a little carpentering, &c., for his neighbours after business hours.

Mrs. *Isabella King:* I am the wife of Mr. G. King, of University Street, and the owner of the house, No. 10, Olive Place. I know the prisoner. He has been a tenant of the house for seven years, or nearly so. One of my daughters lived there before. There was then only one burner in the workshop; none in the outer kitchen.

By Mr. SAMPSON: I do not collect the rent. It is a long time since I was in the house. I do not know what gas-pipes were there. Prisoner has always paid his rent regularly, and been a good tenant.

This being the case for the prosecution,

Mr. SAMPSON asked to be allowed to reserve his defence until the other charges against the prisoner were proved.

The MAGISTRATE remarked that he did not see the necessity for so doing, as there was nothing in common between gas stealing and stealing the other things with which the prisoner was charged.

Mr. SAMPSON said his reason was that if, after hearing all the charges, the magistrate should be of opinion that upon either one of them he must commit the prisoner for trial, he should, out of respect to the Bench, not offer any remarks.

The MAGISTRATE said he should certainly commit the prisoner on the charge of stealing gas.

Mr. SAMPSON said in that case he would reserve his remarks. He would ask, however, if the magistrate was so convinced of the prisoner's guilt as to determine to send the case for trial, whether he would consent, on the prisoner pleading guilty, at once to deal with the case summarily.

The MAGISTRATE said he might be under a wrong impression as to the prisoner's guilt, and therefore he should like the case to go before another tribunal. He had been brought before the court on several charges, and unfortunately, perhaps, he (the magistrate) might have a certain bias against the prisoner; and therefore it would be better for the case to go to trial.

Mr. SAMPSON said he was perfectly satisfied to leave his client in the hands of the magistrate. He knew the strength of the case against him.

The MAGISTRATE: You had better take my advice, and let the case go before a jury who know nothing of the other charges.

The depositions were then read over, and the prisoner having pleaded "Not guilty," and reserved his defence,

Mr. SAMPSON applied for bail, and said that all the other charges against the prisoner were withdrawn.

The MAGISTRATE agreed to accept bail, and was about to fix the amount, when it was intimated to him that the charge of stealing cloth from the Midland Railway Company's premises would be prosecuted. He, therefore, recalled his decision.

Mr. SAMPSON said the police had a large sum of money in hand belonging to the prisoner, also some keys and a watch, and he asked that the money might be ordered to be given up for his defence, or for the support of his family.

The MAGISTRATE declined to do so. On his trial the prisoner might be sentenced to imprisonment and to pay the costs of the prosecution. The prisoner could apply to a judge, but it was not for a committing magistrate to take this upon himself.

Prisoner was then committed for trial on the charge of gas stealing, and remanded until the 13th inst. for the completion of the other charges against him.

CREWE POLICE COURT.—WEDNESDAY, JULY 26.

(*Before Messrs.* J. FOLLIOTT *and* H. TOLLEMACHE.)

STEALING GAS.

Richard Williams, blacksmith, in the service of the London and North-Western Railway Company, was charged with stealing 17,000 cubic feet of gas, and a piece of copper pipe, the property of his employers.

Mr. SHAND, barrister, appeared for the prosecution; Mr. FREDERICK COOKE, solicitor, defended the prisoner, who is said to be a man of considerable means.

From the evidence it appeared that on the 7th of June the gas inspector visited Williams's premises, and found that he had inserted, between the main and his own service-pipe, a piece of copper piping, which enabled him to consume gas without its passing through the meter. The prisoner, who was not at home at the time, went to the inspector's house the following day, and endeavoured to persuade him to keep the matter quiet, saying that the discovery would not have been made if he (the prisoner) had been at home. In reply to the inspector's remark, that this sort of thing had been going on about seven years, Williams said, "No, only about four years." The manager of the works subsequently questioned Williams how he had come by the pipe; when in the presence of a police officer, he admitted that he had taken it from the works.

The BENCH considered the offence had been proved, and they fined Williams £5 and costs.

Miscellaneous News.

METROPOLIS GAS SUPPLY.

METROPOLITAN BOARD OF WORKS.—At the meeting of the Board on Friday last, the Works Committee brought up a report submitting returns to an order of the House of Commons, showing "all sums expended during the last five years; and all sums expended in promoting and opposing any bills of Parliament, or in compiying with the Standing Orders of the Houses of Parliament as to bills introduced, or opposing or supporting bills before committees of Parliament, or as to inquiries before select committees of both Houses of Parliament; specifying date of the session, the object promoted, the inquiry before Parliament, and the result of such bills promoted or opposed, whether withdrawn or passed." The clerk was instructed to forward such returns for presentation.

LONDON GAS COMPANY.—The works of this company at Nine Elms are about to undergo some extensions. In addition to the erection of new buildings on their premises, the directors have obtained the sanction of the Battersea local authorities for the construction of a bridge across Nine Elms Lane to carry a tramway which they are about to make from their wharf at Nine Elms to the works, for the carriage of coals from the steamers. The height from the centre of the roadway to the underside of the bridge is not to be less than 22 feet, and the parapets of the bridge to the openings over the road, and each side, are to be close fenced with wood to a height of not less than 6 feet. The bridge is also to be encased, and otherwise constructed and maintained so as render it noiseless and water-tight. In consideration of being permitted to construct this bridge over Nine Elms Lane, the company have undertaken to widen the road over Millpond Bridge as far as their wharf extends, by setting back their wall from 5 feet to 6 feet, and to pave the road as widened at their own expense. The construction of the second large gasholder at Batterseа is making satisfactory progress.

METROPOLIS WATER SUPPLY.

The following are the returns of the Society of Medical Officers of Health, on the composition and quality of the metropolitan waters in July, 1876:—

NAMES OF WATER COMPANIES.	Total Solid Matter per Gallon.	Oxygen required by Organic Matter, &c.	Nitrogen.		Hardness.	
			As Nitrates, &c.	As Ammonia.	Before Boiling.	After Boiling.
Thames Water Companies.	Grs.	Grs.	Grs.	Grs.	Degs.	Degs.
Grand Junction	20·30	0·040	0·105	0·000	14·8	3·3
West Middlesex	18·70	0·051	0·120	0·000	14·0	3·0
Southwark and Vauxhall	18·20	0·051	0·111	0·000	15·4	2·4
Chelsea	19·40	0·055	0·108	0·000	15·4	2·4
Lambeth	19·60	0·059	0·120	0·000	15·4	2·4
Other Companies.						
Kent	27·10	0·007	0·330	0·000	18·8	3·3
New River	18·40	0·020	0·105	0·000	14·3	2·6
East London	18·10	0·036	0·105	0·000	14·8	3·8

Note.—The amount of oxygen required to oxidize the organic matter, nitrites, &c., is determined by a standard solution of permanganate of potash acting for three hours; and in the case of the metropolitan waters the quantity of organic matter is about eight times the amount of oxygen required by it.

The water was found to be clear and nearly colourless in all cases but the following, when it was slightly turbid—namely, Grand Junction.

C. MEYMOTT TIDY, M.B.

NORTH BRITISH ASSOCIATION OF GAS MANAGERS.

(*Continued from page* 173)

Mr. D. BRUCE PEEBLES (Edinburgh) read the following paper on

GAS-GOVERNORS, WITH DESCRIPTION OF PEEBLES' PATENT GOVERNORS FOR STATIONS, DISTRICTS, DWELLING-HOUSES, AND PUBLIC LAMPS.

In the early days of gas lighting, amongst many other difficulties encountered by gas engineers, that of controlling pressure must have obtruded itself persistently and vexatiously, and none the less so that its influence in modifying the quantity and quality of the gas produced, and economizing its consumption, was not so well understood or appreciated as in the present day.

The exhauster was then unthought of, so that in the very first process of the manufacture the production of gas was hindered, while, after it was made and stored, the influence of pressure was again felt in the difficulty experienced in retaining it in the vessels and pipes for distribution. The excellent manufactures in distributory plant at the service of the gas engineers of the present day were not then to be had; indeed, so difficult was it to obtain service-pipes, that old gun-barrels were pressed into use, and patents taken out for making pipes of wood and of paper. With such materials as these, the jointing must of necessity have been very imperfect, and leakage—that nightmare which even now haunts the pillow of many a gas engineer—must have been a source of irritation, annoyance, and loss.

From the valuable annual report of the West of Scotland Gas Managers Association for 1875-6, lately published, out of 68 Scotch gas companies, whose managers filled up the leakage and unaccounted-for gas column, we find—

11	companies	having	a	loss	of	from 7 to 9	per cent.
15	,,	,,		,,		10 ,, 14	,,
21	,,	,,		,,		15 ,, 19	,,
14	companies	having	a	loss	of	20	,,
3	,,	,,		,,		22	,,
2	,,	,,		,,		24	,,
1	,,	,,		,,		25	,,
1	,,	,,		,,		33	,,

With such results, even with the excellent pipes and tubes now made by many eminent firms, employing machinery of the most perfect description, and devoting their whole time and attention to the manufacture, what must leakage have been in early times, when engineers had to use any kind of makeshifts, and had no proper means of even estimating or checking the loss therefrom? In order to clearly understand the effect of pressure on leakage, we shall only consider the results of a single experiment on the discharge of gas through an aperture at different pressures. If we take a piece of metal half an inch thick, and drill a hole through it 2-10ths of an inch in diameter, as representing a small leak in an ordinary 6 or 8 inch gas-pipe, we find, through this small aperture, the discharge of 28-candle gas to be as follows:—

Pressure.	Quantity per Hour.
0·5 inch.	42·603 cubic feet.
1·0 ,,	59·016 ,,
1·5 ,,	73·469 ,,
2·0 ,,	84·705 ,,
2·5 ,,	94·737 ,,
3·0 ,,	102·857 ,,

Delivery of atmospheric air through an aperture of the same dimensions—

Pressure.	Quantity per Hour.
0·5 inch.	33·953 cubic feet.
1·0 ,,	42·105 ,,
1·5 ,,	52·173 ,,
2·0 ,,	60·000 ,,
2·5 ,,	66·512 ,,
3·0 ,,	73·069 ,,

The specific gravity of air being 1·000, and 28-candle gas about 0·645, we would, of course, have a much greater leakage with 15-candle gas, having a specific gravity of about 0·443. In these experiments, no account was taken of temperature or barometric pressure. They merely show approximately what an enormous loss may take place by continuous leakage through cracks in pipes or badly-made joints, and also the effect of pressure in increasing or diminishing that loss. We here have a discharge of 42·6 cubic feet per hour at 5-10ths pressure, and by an increase of only 15-10ths, the delivery is as nearly as may be doubled.

This gives us some idea of the necessity of keeping down pressure in the

mains to the lowest possible point compatible with a proper supply to consumers, and it also accounts for the ruinous results which must and do take place where there are badly-laid mains, and the gas let away freely from the gasholders without check or hindrance.

As might be expected, the attention of gas engineers was soon directed to the necessity of getting some method of modifying and controlling pressure, and the first attempt seems to have been made by Clegg in 1815. In that year he patented a governor theoretically the same as those now in use, although deficient in one of the most essential parts—viz., the cone valve. Improvements were soon made, however, as we find that Accum, who wrote a treatise on the manufacture of coal gas in 1819, described and illustrated a governor, having a cone attached to the dome of the bell, and closely resembling the instrument of the present day. Peckstone, another writer on the same subject in 1841, gave a description and drawings with little, if any, improvements on the governor described by Accum. Attention had not then been so thoroughly roused to the importance of the subject as it should have been, if we may judge by the patent list, as we find only 15 patents taken out between the years 1815 and 1841; but between the latter date and up to 1866 no less than 249 patents were granted, while since then every year has added largely to the list, nor does there seems any likelihood of inventors leaving the governor alone even now, so that ultimately we may expect to see a perfect instrument.

Notwithstanding the labour that has been bestowed upon it, and the time that has been spent in endeavouring to improve it, no great progress has been made, and not much novelty introduced either in its construction or action.

It would be a worthless task to enumerate or describe the many varieties of governors which have been invented or even manufactured, and we shall, therefore, only consider those which have come into ordinary use, and which experience has proved to be reliable instruments, although, in doing so, many may be missed, having good points in their favour.

Beginning with Clegg's governor, which deserves our special consideration, as being the first model of an instrument which has come into such general use, we find, on looking at the drawing, that we have a bell or holder working in a tank amongst water, with a pipe standing above the water-level, for the admission of regulated gas between the top of the bell and the water. A beam is supported on a pillar, and works on an axis in a similar manner to an ordinary scale beam. At each end an arc is formed for chains working over, to one of which is attached the bell, and to the other the balance-weights. On an arc nearer the centre of the beam a chain is hung, to the end of which a cup containing mercury is attached. Dipping into the mercury is a pipe, having a partition, the conduit on one side of the partition being connected with the inlet gas, that on the other side with the outlet gas. At the bottom of the partition is an aperture, which is closed or opened as the cup with mercury is raised or lowered. When the outlet pressure required is adjusted by the balance-weights, there should then be no variation, because, should the initial pressure be increased, the aperture is proportionately closed, while, if it be decreased, the aperture is opened in a corresponding degree with the same result. A responsive action takes place also with the varying rates of consumption. If a large supply is wanted, the gas is drawn away from under the bell, which immediately falls, opening the aperture; while, if consumption decreases, the bell immediately rises, giving a less supply at the same pressure.

We may notice particularly here, that in Clegg's governor, which is the prototype of all those now in use, we have a constant outlet pressure, with a variable opening.

Four years after the date of Clegg's patent, Accum published his treatise on the manufacture of coal gas, and in it we find the float governor clearly described. The drawing shows us the instrument, having a bell with annular float attached to it, and a cone valve hung from the dome of the bell. The float serves the same purpose as the back balance-weights of Clegg's governor—viz., to raise the bell and diminish the gas supply. The result of the action is also the same as in Clegg's, but the cone valve was an immense improvement on the mercurial seal, as it was much more delicate in its action, and obviated all danger of blowing. The three varieties of station governors most extensively used at the present time are the beam governor, the wheel governor—which is merely a modification of the beam—and the float governor. With these we are all familiar, and if we compare them with those we have now described, we see how little advance has been made, and how closely the two early types have been followed.

Coming between the wet and dry instruments, is the mercurial governor, which, so far as I know, has only been used for house purposes. These have long been made by Mr. Hulett, of London, who patented his arrangement in 1854. A later form is that made by Mr. Busch, of Oldham. He employs a bell made of glass, which works in a mercurial seal, the valve being suspended from the glass bell in a similar manner to the governor invented by Loos, which we shall notice when we refer to lamp governors. These mercurial governors give very good results, but mercury is expensive and awkward to work with, while its tendency to act on other metals is somewhat against its use. Accidents have not been uncommon from its being spilt into gas-meters, whereby the block-tin cylinders and pipes have been destroyed. No doubt, for some of these reasons, the mercurial governor has not come into such extensive use as it otherwise would have done.

The first really useful dry governor was invented by Samuel Crosley so far back as 1825, and although it is 51 years since his specification appeared, it might be fairly used to describe the dry governors of the present day. No doubt many of them are modified and considerably improved, but the action of the whole of them depends on the use of a flexible diaphragm raising a plug or valve, or actuating a lever, to which the valve is attached. We shall examine the house governors before us later on. Meantime, the high-pressure governor invented by Mr. Duckham may be mentioned here as one suited for using with compressed gas. The peculiarity of his arrangement is, that the diaphragm is connected with the long arm of a lever, to the other or short arm of which the valve is attached. This governor was in use on the Midland Railway some years since, when compressed gas was tried for lighting the carriages. The system did not give satisfaction, and was abandoned; but not from any fault of the governer.

Besides sending out gas, and controlling it, so as to give a proper average pressure to the level parts of cities and towns, there are districts of great elevation to be supplied, such as we have in Edinburgh. To illustrate this part of the subject, we may refer to the position of the Edinburgh and Leith Gas-Works, in connexion with one or two of the elevated districts to which the gas is supplied. Setting aside the gasholders at Canonmills, and assuming that the gas is sent from Baltic Street, Leith, we have Princes Street, at an altitude of 206 feet, Liberton, 236 feet, and parts of the Lawn Market 288 feet above the level of the work; and as pressure increases about 0·1 inch on a water-gauge for every 10 feet of altitude, and the minimum day pressure at Leith is 0·8 inch, we have in the daytime a pressure of about 2·9 inches at Princes Street, 3·1 inches at Liberton, and 3·6 inches at the Lawn Market.

The night pressure at the Leith works is 1·7 inch, so that 0·9 inch should be added to the above day pressures, to give the night pressure at the three elevated points named, which, however, will be considerably modified by the variable consumption going on between the works and these districts, and also by the friction in the pipes. To remedy this accession of pressure, an automatic instrument is required, which will respond and act in sympathy with the station governor at the works, reducing or increasing the pressure at the district when it is reduced or increased at the works. It will be obvious than an ordinary governor cannot do this, because, as we have seen, when once it is adjusted, the outlet pressure remains invariable, unless the weights are altered.

The late Mr. Orlando Brothers, of Blackburn, one of a family of talented gas engineers, invented a very ingenious governor for district purposes. It consists of a cylindrical case, with inlet and outlet pipes, as in the ordinary governor, and the bell or holder is formed with what is termed a difference chamber, as seen on the drawing. This difference chamber is connected with the atmosphere by a pipe, which supplies or discharges atmospheric air as the holder rises or falls. The tank or casing is closed by a cover, and gas is admitted between the cover and the top of the bell by a small tube communicating with the inlet-pipe. It will be observed, also, that the air-chamber or float extends from the bottom to the top of the bell, so that, as more water is poured into the tank, the greater will be the buoyant power of the float, and the stronger its tendency to close the valve.

Supposing the governor to be fixed at some of the districts named, at a distance from the works—say Princes Street, which is 200 feet higher than the site of the Leith Gas-Works—the tank is then filled to the water-line, and gas turned on. We see that the gas has free entrance to the space between the bell and the outside casing, and acts upon the full area of the top of the dome, tending to force the bell downwards, while gas, at the same pressure, ascends through the annular space between the two pipes, and acts upon the under side of the dome, tending to force the bell upwards. But the area on which the gas acts on the under side of the dome is decreased by the space taken up by the float and the difference chamber, so that while the same pressure is acting on the upper and under sides of the dome, we see that the area on the under side, subject to the action of the gas, is only about half that of the area on the top side. The stronger the initial pressure becomes, therefore, the greater power will it have to force the bell downwards and open the valve, and as the initial pressure decreases, the bell will rise by the power of the float and close the valve, and we now observe that all that is necessary for adjusting the governor to any required outlet pressure is to fill in or run off the water in the tank.

If the outlet pressure be too high, water must be added until the float raises the holder or bell, and so far closes the valve until the pressure desired is obtained, and the opposite course is to be taken if a heavier outlet pressure be required. When the governor is adjusted, all that is necessary, in order to maintain the desired outlet pressure, is to keep the water at the proper level, and so long as an unvarying inlet pressure is maintained, the district governor will give the same outlet pressure. It is, therefore, perfectly automatic, responding to all the changes of pressure established by the station governor, increasing or diminishing pressure as it is increased or diminished at the works. Shortly after Mr. Brothers's appeared, Mr. Cathels invented his district governor, and from the drawing we observe that his improvement chiefly consists in turning the valve of the ordinary governor upside down, and reversing the pipes. By doing so, he at once got the responsive action in a simple way, and although his invention is suitable for a wet governor, he seems to have entirely abandoned it in practice as being unsuitable for connecting with mains at a distance from the works. His dry district governor consists of a flexible diaphragm moving freely within a chamber, and having a valve of a parabolic or hemispherical shape suspended from it, with its apex or small end downwards.

The inlet gas is led directly into the chamber below the diaphragm, and therefore every variation of the inlet pressure tends either to open or close the valve. When the time of lighting-up comes, and an additional pressure is put on at the works, it acts immediately on the diaphragm of the district governor, opens the valve, and gives a proper night supply to the district, and when pressure is taken off at the works, the diaphragm responds and closes the valve until the desired day pressure is established.

We notice that with both of these governors a constant outlet pressure may be got, but only if there be no variation in the initial pressure. If it varies either, by the action of the station governor, or from a varying consumption taking place between the two governors, the district pressure will also vary.

So far as instruments of pressure are concerned, we have only now to consider governors for single jets, such as are used in public lamps, and of these there are many varieties in form and construction.

We have before us a number of these governors by different makers, from which their general construction may be clearly seen. All of them, except one, depend on the action of a flexible diaphragm, the exception being a mercurial governor by Loos, already referred to, which is worth examining. There is an ingenious arrangement for carrying the gas to the burner, and the instrument is simple, small, and neat in form. Mercury is poured into a channel in which the bell works, and from the bell a valve is suspended, which opens and closes according to pressure, as in the ordinary lamp-governors.

We have stated that Clegg's governor, and all of that type, are pressure governors, they give a constant pressure with a varying delivery; but there is another class which give a constant delivery with a variable pressure. With the first, a constant pressure is maintained, whatever may be the variation in the consumption; with the second, a constant volume is delivered at a variable pressure, according as the size of the orifice or the number of burners varies.

The first volumetric governor seems to have been invented by Mr. John Leslie, in 1841. It consists of an inverted vessel or bell, working in oil, and having a cone fixed on the dome of the bell, which works in a seat placed in the cover of the casing. He named it an Automatic Gas Economizer; but, like others of this class, it is only suited for single jets, or for supplying a specified and unvarying number of lights. The action depends upon the bell being sustained between two pressures, which have a constant unvarying difference. In this case the gas is delivered through an invariable orifice at an unvarying pressure, the valve being employed to establish the differential pressure on which the action of the apparatus depends.

In 1870 M. Henri Giroud, of Paris, working in ignorance of what had been done, reinvented and patented a governor, the action of which is exactly the same as that of Leslie, although he modified its construction, and brought it into a more suitable form for using with single burners. He named his apparatus a Rheometer, or flow-measurer, in contradistinction to the pressure governor. From the drawing we see that it consists of a closed cylindrical casing, into which a very light bell is placed in a circular channel filled with glycerine. The invariable orifice is made in the dome of the bell, and on the top of the bell the valve is placed, which works in a seat in the top of the casing, the same as Leslie's. The other drawing represents a disc rheometer, in which glycerine is dispensed with. While giving Giroud much credit for what was, no doubt, an original invention on his part, and for the ingenuity with which he has carried out his ideas, we are bound to say that he was completely anticipated by Leslie, to whom the honour of the invention doubtless belongs.

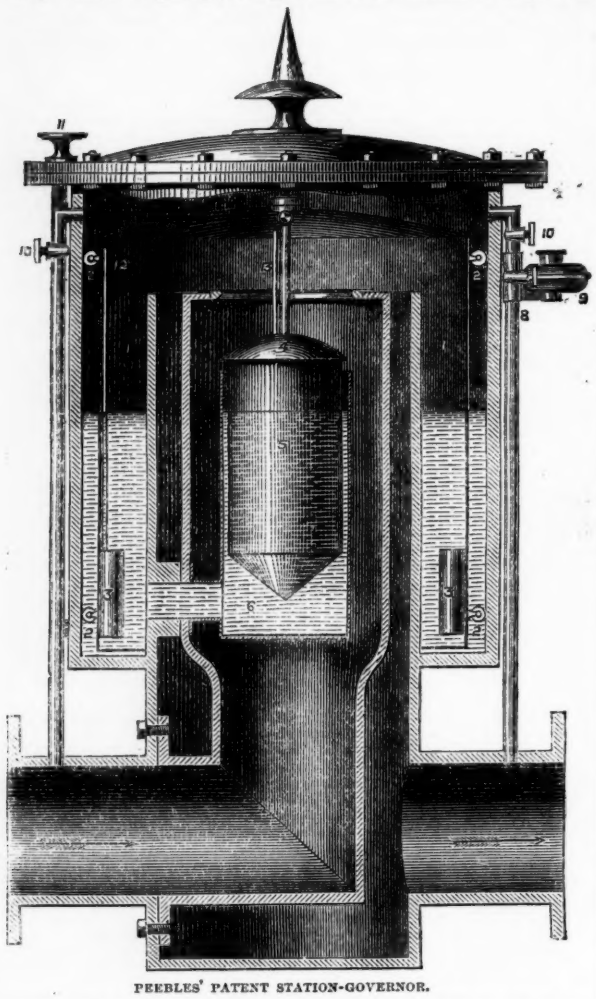
About 12 or 13 years ago a very serious accident occurred at one of the large gas-stations in London, caused by the bell of a gas-governor tilting and allowing an escape of gas, which, mixing with atmospheric air, caused an explosion resulting in great loss of life and destruction of property. Many modifications of the governor were proposed to prevent the recurrence of such an accident, but no great improvement resulted from the numerous suggestions then offered. Guide-rods and stops to prevent the bell from rising too far or tilting were in many cases adopted; but the accident was soon forgotten, and the old forms manufactured as before. I formed a very strong opinion then that all the vessels or instruments in gas-works shut up in rooms, and having no free communication with the atmosphere, should be gas-tight. About 18 months ago another accident happened in Accrington, also from a governor,

and although no lives were lost there, a good deal of property was destroyed; and had it not been for the prompt measures taken by Mr. Key, then manager, the result might have been serious indeed. This strengthened my previously formed opinion, and I dare say there are few but will agree that it would be most desirable to render every vessel or instrument used in a gas-work gas-tight, so that an escape would be impossible.

The ordinary governor seems, and really is, perfectly safe, when in proper working order; but yet, what has happened may happen again, and, therefore, any approach to securing a gas-tight governor, is a step in the right direction.

The instruments of pressure I have the honour to bring before you to-day are of four different kinds—viz., for stations, districts, houses, and public lamps.

Taking the station governor first, we observe that the bell or holder is entirely enclosed in a gas-tight casing, so that an accident from an escape is impossible. The bell, 1, works freely in the case, being guided by a set of four pulleys, 2, at top and bottom. Attached to it is an annular float, 3, as in the common governors, and from the dome of the bell is suspended a valve, 4. We observe also that the arrangement of the pipes is similar to those which have long been in use. When we look at the other parts, however, we find that there is little in common with the ordinary forms or modes of action. Instead of the well-known parabolic form of valve now employed in all station governors, a spherical valve, 4, is used, attached to which is a parallel cylindrical body, 5, with a conical bottom, which works in a vessel, 6, having communication with the water in the outer casing. There is no possibility of loading the bell with weights, nor is it possible to alter its buoyancy either by filling in water or running it off within reasonable limits, because the float is far below the water-line, and quite unaffected by any ordinary variation of the water level. On each side of the case there is a small pipe, 7, connecting the space above the bell with the inlet and outlet pipes, and to the pipe on the inlet side a four-way cock, 8, is fixed, to which a small governor, 9, is attached, which may be either of the wet, mercurial, or dry kind. In the small pipe on the outlet side a disc is placed, through which is drilled a small hole. To both pipes stop-cocks, 10, are attached, by which the gas can be entirely shut off, so as to give access to the space above the bell if required. Water can be supplied to the tank by the filling-tube, 11. A ventilating-tube for the float is shown at 12, and another for the cylindrical vessel attached to the valve at 13.



PEEBLES' PATENT STATION-GOVERNOR.

The action of the instrument is as follows:—Water being filled in to the proper level, the float comes into action, raising the bell and closing the valve, the size of the float being calculated to do so when the governor is out of action. Gas being turned on, pressure is immediately established above and below the bell; that below being dependent on the initial pressure and the rate of consumption, while the pressure between the case and the top of the bell is regulated by the small governor. By this means, therefore, we can, as it were, load the bell with different gas pressures instead of weights, and great delicacy of action is thus obtained, which must be due to the entire absence of friction in the large governor, the bell of which floats as freely as a cask or a cork does in water, and responds to every change of pressure promptly and accurately. This delicacy would be fatal to it were it not for the valvular arrangement, which is indispensable. In the ordinary governor the valve has always given trouble, because at certain points, especially when a limited supply of gas is passing, there is a great tendency to pulsation or bobbing, the reason of which is that the area of the cone base, particularly when near the closing point, is acted on powerfully by the inlet gas pressure. This addition to the regulated pressure, which is acting on the area of the dome of the bell, gives a tendency to close the valve entirely, which it sometimes does, and when this happens, as consumption still goes on, the gas is drawn away from under the bell, which falls and again opens the valve. The elasticity of the gas promotes this action, which, once being set up, a continuous bobbing or jumping is the consequence, the pulsations or strokes being perfectly isochronous, and having a constant tendency to increase in intensity.

This phenomenon is no doubt perfectly familiar to many here. The more delicate the action of the governor is, the greater likelihood is there of it taking place; and, coming on as it does at most unexpected times, it constitutes a great annoyance not unattended with danger. An accident happened to a governor some years ago, the consequences of which might have been serious had it not been immediately discovered. On examination it was found that the rod to which the valve was attached was broken. There can be little doubt that these pulsations were the cause, the rod having far more strength than necessary to merely suspend the valve. By this new arrangement we see that the pressure is taken entirely off the bottom or cone base of the valve, and all tendency to unsteadiness of action is thus prevented. It can be applied with equal advantage to the ordinary float governor. Mr. Hartley, of London, and Mr. Warner, of South Shields, have each devised an ingenious equilibrium arrangement, which obviates the tendency to pulsation. They place a small gasholder in a separate tank, the area of the holder being exactly the same as the area of the cone base of the governor, and so connected and arranged that the inlet pressure acts upon both, the action on the valve being thus neutralized.

Mr. Warner's governor is entirely enclosed, and he adjusts the pressure by a lever attached to a horizontal shaft passing through a stuffing-box.

In the ordinary float governor there has always been a great tendency of the float to leak, which is a serious objection, but we shall have no difficulty in discovering the cause if we consider the large volume of air sealed up, and now and again subjected to changes of temperature. We can see that there must be a continual straining of the joints, as with an increase of temperature there will be a tendency of the float to bulge, while if the temperature decreases there will be a tendency to collapse. Ultimately the jointing will give way, admitting water and destroying the buoyancy. To prevent this, a small ventilating-tube, 12, is carried from the float to the top of the bell, thus relieving the confined air, and the float being made of block tin, we may expect it will be one of the most lasting parts of the instrument.

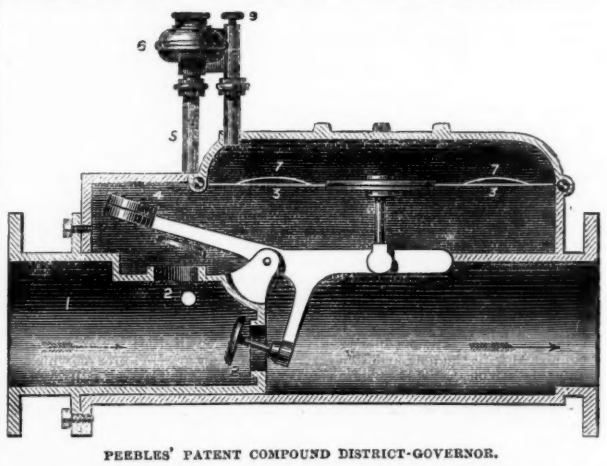
Instead of the large heavy weights which are necessary for altering the pressure with the ordinary governor, small weights are used, so light that they might be carried in the pocket without inconvenience.

We shall now try the action of the governor with the pressure we have at our command, and note its behaviour under different degrees of initial pressure, and also with different rates of consumption. We see that by putting one of these very small weights on the small governor, there is an increase on the outlet pressure, and as weight after weight is added, we notice that the large governor responds with precision and delicacy. Let us now adjust it to a pressure of 1·0 inch, and note its behaviour under varying initial pressures and with different rates of consumption, and we observe that the gauge remains steady under all these tests.

Another novelty is that the action of the governor may be controlled, and the pressure altered at a distance from the governor itself. By taking a small tube from any part of the main between the gasholder and the governor, and bringing another tube from the space above the bell, and connecting these with the small governor, the action is quite as certain and complete as when the small governor is close to the large one, so that the manager may have these pipes led into his office, or even into his house, though at a distance from the works, and alter the pressure at any time without rising from his seat.

We have here 40 feet of india-rubber tubing, and we shall attach the small governor to it, and then try its power in controlling the action of the large one. We now notice that when we take off or put on a small weight at the small governor, we have the same responsive action as when it is close beside the large one. This peculiarity might be taken advantage of in large theatres or halls, as with a small compound governor of this decription a person sitting amongst the audience, or in any part of the house where the small governor could be conveniently placed, might lower or raise the lights promptly, without having to manipulate large stopcocks.

We come now to the district governor, and by examining the drawing before us we see that it acts in precisely the same way as the station governor we have just described, and seen in action. Indeed, these dry governors are admirably suited for station governors for small works. The gas enters at 1, passing through the valves, 2, and, acting on the under side of the flexible diaphragm, 3, it tends, in conjunction with the weight, 4, to close the valves; but the inlet gas, passing through the pipe, 5, and the small governor, 6, acts upon the upper side of the diaphragm, 7, tending to open the valves, and according to the degree of pressure to which the small governor is adjusted, so will be the outlet pressure given by the large governor, which never will be exceeded, however much the initial pressure may be increased. This action is exactly the same as that of the station governor; but when we wish to use it as a district governor a stopcock or screw valve, 9, is employed to establish the minimum day pressure. When the day pressure is on at the works, the district day pressure is established by keeping the valve of the small governor entirely open, and out of action, and moving the stopcock or screw-valve, 9, until the desired district day pressure is obtained. The night pressure is then put on at the works, and the small governor, 6, adjusted, by the weights, to give the desired night pressure, which cannot then be exceeded under any circumstances, unless the weights of the small governor be purposely altered. We have thus the command of two district pressures, a maximum and a minimum, dependent on the action of the governor at the works; and it must be understood that



PEEBLES' PATENT COMPOUND DISTRICT-GOVERNOR.

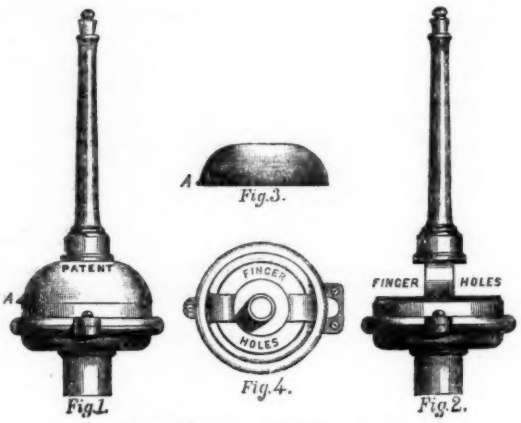
the district governor, being automatic, requires no attention after being once set.

We shall now put the district governor in action; and let us suppose that there is a pressure of 0·8 inch wished as the district day pressure, which is to be increased to say 1·8 inch, as the required maximum night pressure, and let the small gasholder we have here be supposed to be the governor at Leith, set, to give a pressure of 2·0 inches at the elevated district where the governor is placed. We now adjust it by the stopcock or screw-valve to give a pressure of 0·8 inch as the day pressure, and so long as the pressure at the works is not increased, the district day pressure will remain the same; but, if we increase the initial pressure, the district pressure will also increase, until it comes to the point at which the small governor is set—viz., 1·8 inch, and there, as we see, it remains steady, however much the inlet pressure may be increased.

The house governor is a simple instrument, free from any complex parts which would be liable to go out of order. The peculiarity of the one before us lies in the jointing, and in the employment of animal membrane prepared with glycerine for the diaphragm. There has always been a great objection to the smell given off from house governors, on account of the diaphragms leaking through the pores of the leather. This membrane prevents that thoroughly, and also, when combined with leather, adds greatly to the strength of the diaphragm, which, therefore, lasts much longer, and gives no trouble.

These governors are quite sensitive enough for all ordinary purposes, so far as the economical combustion of gas is concerned, the variations on the outlet pressure never exceeding 0·2 inch under extreme variations of the initial pressure or the rate of consumption. Simple in construction, made of lasting materials, easily repaired, and most reliable in action, they are giving satisfaction to thousands who now have them in use, and, in conjunction with good burners, the resulting health, economy, and comfort must be incalculable.

It is scarcely necessary to take up time in describing the lamp-governor, the peculiarities of which are now well known. With ordinary lamp-governors



PEEBLES' PATENT LAMP-GOVERNOR.

there has always been a difficulty in testing and rating them. Indeed, there is no way of adjusting the pressure but by taking them to pieces. They must then be tested, and afterwards refitted, which involves much loss of time and a great deal of trouble. With this governor no refitting is required, as will be readily seen by referring to the drawing, and to the governor before us, which is in section. Fig. 1 shows governor complete; fig. 2 represents the governor with brass cap (fig. 3) removed, showing finger-holes, by which access may be had to the diaphragm for adjustment; and fig. 4 shows plan corresponding to fig. 2. It will be seen that after rating or adjusting the pressure, the parts never require to be interfered with, as nothing is needed but to press down the brass cap (fig. 3) over the governor, and fix it in its place. It will be observed that it differs from all governors of the same class in being made of cast iron, which will not melt in the lamp, as some of these others made of soft metal do. The removal of the brass cap is easily done, and gives ready access to the diaphragm, so that weights may be put on or taken off until any desired pressure is obtained, the burner never having to be taken out of the tube during the operation, and no refitting of the parts being required.

In 1874 Dr. Wallace, of Glasgow, read a paper "On the Economical Combustion of Coal Gas," before the Philosophical Society of that city. Referring to these governors, he said: "Already about 9000 of these have been supplied to the city of Glasgow, and I understand that it is the intention of the authorities to introduce them all over the town, the saving thereby effected I calculate to be about £6000 per annum, without any diminution of light." Since the above was written, another 4000 have been supplied, making in all about 13,000.

Between 70,000 and 80,000 of these house and lamp governors are now in operation, and it is most probable that the use of gas-governors of all kinds will continue to extend as the attention of gas engineers and corporations is being more and more directed to the advantage of maintaining low pressure in the mains, so far as it possibly can be done consistently with a proper supply to consumers, while a movement has been commenced by gas managers, having for its object the education of consumers as to the best method of burning gas, so as to get the full value of the illuminating power at the least expense, and, at the same time, maintain a healthy atmosphere during its combustion.

We have now considered some of the methods and instruments employed for accomplishing these ends, and, in closing, I beg to thank you for your patience and kind attention to what, I am afraid, has been too long a paper, considering the limited time at your disposal to-day.

Mr. Robb (Haddington): It is now two years ago since Dr. Wallace read his paper, and, no doubt, it will be known by this time whether these gas-governors have effected the saving it was anticipated they would effect. I see Mr. Key here from Glasgow, and I should like to know if anything like the amount of saving that Dr. Wallace calculated has taken place. As yet we have no real information upon this point. One difficulty I have always experienced is that of educating consumers to know anything about gas. We cannot get them to look at their burners, and far less can we get them to regulate small intricate machines such as governors. In the town with which I am connected, a great number of mercurial governors were put in, but people did not pay attention to them, until down went their gas. Then I had to employ plumbers to take out some scores of these machines, and when I saw there was to be no end of it I told the people that they must take out the governors themselves, for I was not going to put in mercury, and otherwise repair them. It is, therefore, upon such matters I desire information.

Mr. Hislop (Paisley): I am acquainted with the whole system of governors which Mr. Peebles has brought before us to-day, and I very much admire the arrangement by which the pressure can be regulated up to the amount of pressure in the gasholders. I was, perhaps, the first who witnessed this arrangement of Mr. Peebles' in regard to the station governors, and I was so much struck with its beauty and simplicity that I took occasion to refer to it last year, at our annual meeting. Since that time I have had an opportunity of introducing them into practical use, and, I am happy to say, with the utmost success; and I have placed in Mr. Peebles' hands orders for other two of these governors. I find it difficult, in my experience, to convince small companies of the importance of governors. Somehow or other they think that a controlling medium in the form of a screw-valve is all that is necessary to answer this purpose. That is a great mistake. The efficiency with which such valves regulate the supply must depend on the amount of gas drawn off to supply a town, and it must, therefore, be irregular. I think it would be a matter of great importance to such companies if they could see their way to introduce, even into the smallest works, the use of these governors. I am bound to say they would pay themselves nearly every year. Of all the governors I have seen and considered, I do not think there is any that can equal those of Mr. Peebles. They are wonderously simple, and the smallness of the weight is so different from the cumbrous weights we have at present to remove, and the removal of which causes such vibration of pressure. Unless the man in charge takes them off gently, there is a sudden jerking, or vibration; but, by Mr. Peebles' arrangement, this difficulty is obviated. The weights are so small they can be carried in our pockets, and the putting on or taking off of which produces no bobbing or pulsation. The whole arrangement commends itself to our judgment, and I expect these governors will be largely adopted, and I, personally, will be glad to learn that this is so.

Mr. Smith (Aberdeen): I would like to know whether any of these station governors have been in use for any time, and if they have given satisfaction. It appears to me that the small pipes leading to the governor would be apt to choke. Of course Mr. Peebles has an ingenious arrangement by which the action of the small governor can be dispensed with, but, in the meantime, great damage might be done if the lights should go out.

Mr. John Reid (Leith): I have great pleasure indeed in expressing a very high opinion of the beauty and singular adaptation of this invention of Mr. Peebles. It is not the first time I have had the pleasure of listening to his paper. The subject was brought before the Royal Scottish Society of Arts by Mr. Peebles some months ago, and two or three gentlemen were nominated as a committee to examine carefully into the invention, and to give in a report. I have the honour of being one of that committee. We had an opportunity, in Mr. Peebles' establishment, of thoroughly testing the whole of the effects which he has shown us so admirably to-day, and I think the best way of expressing my opinion would be to say that I entirely coincide with the report brought by the committee to which I have referred—namely, that this is an invention of singular ingenuity, and a striking and fitting adaptation to the purposes for which it is intended; and that, while we are perfectly satisfied with the correctness of the theory and the completeness of the arrangements for carrying it out, we see nothing to lead us to the belief that in any case will failure accompany the employment of these governors, but we wait to see some instance of their adoption on a large scale. I was glad to hear Mr. Hislop mention that he had already introduced some of these governors, and I am sure, when he has a year's experience of them, that we will get a confirmation of the opinion which we, as a committee, have formed. I have great pleasure in moving that this Association convey its best thanks to Mr. Peebles for the admirable manner in which he has delivered his paper, and for the beautiful way in which he has illustrated his subject by diagrams. Before sitting down, I do not think it would be out of order to read to you a telegram which I have received since coming into the room, from a gentleman who expected to be present, and which, I think, is worthy of the study of our friend Mr. Peebles, and any other of our friends who may be inclined to take up the subject:—"Having got myself slightly burned at works, cannot meet you. I wish to offer a prize of £10 for the best essay—'Is it Possible to do without the Aid of Gasholders, and what Practical Apparatus or Means can be Suggested to Serve the Same Purpose?'" This is a question which, I think, from the terms of the telegram, I am entitled to lay before you. The gentleman is Mr. Andrew Stewart, of the firm of Messrs. A. and J. Stewart, Glasgow.

Mr. W. Key: As my name has been referred to in connexion with this question of governors, I may say that I have listened with great pleasure to Mr. Peebles' paper. I consider this one of the most important subjects that can be laid before such an Association. By the adoption of governors in the distribution of gas, hundreds and thousands of pounds have been saved to gas companies. The subject cannot be too earnestly forced on the attention of gas managers. I do not think that there is any man in the United Kingdom who has given so much attention to the question of gas governors as Mr. Peebles, and the result has been a crowning success. To-day he has exhibited an instrument which cannot be beaten, it is so novel in its arrangement. I have seen the governors of Mr. Brothers, and Mr. Peebles' seems to have avoided their faults. Mr. Brothers' arrangement, to have a tube connected with the atmosphere, is a great fault, because it rusts in the inside, and soon corrodes. I have witnessed very alarming pulsations from the cone being very nearly closed, and a heavy pressure acting upon it; but Mr. Peebles' arrangement prevents that. He has introduced a controlling governor, so that no such pulsations can occur. That means increased safety to gas managers. The feeling at present is in the direction of using safety station governors. From letters which I have received from England, I have discovered that eight or nine accidents have happened, and which have resulted in loss to the companies which might have been prevented by the introduction of the arrangement which I then had. I am glad to see that Mr. Peebles has got over the only objection which I had to his arrangement, by introducing a small four-way cock to control the direction of the pressure in case of the small governor getting out of order. Mr. Smith says that small tubes may choke up, and might be objectionable in working. I may state that two of my governors have been working for four or five months in one work. The whole supply is regulated through an inch tube, and although I have written to see whether there is any complaint against the governors, I have not heard a word.

Mr. Mitchell (Dundee): I think that gas managers should try and get consumers to think more upon this question. The general remark has been made, that perhaps £6000 has been saved in Glasgow. That looks like a large sum, and I do not know whether it has been saved or not. There can be no doubt, however, that if the money is not saved, a larger amount of light is got than hitherto, with the same amount of gas. I may say that I have made several experiments myself with governors, and I find that the quantity of gas burned through a burner with 13-10ths of pressure, and the same quantity burned at 4-10ths, will absolutely give fully three times as much light. I made some experiments with a five-light governor the other day. I had ten lights burning, and these consumed about 25 feet per hour. I found I could turn off nine of these lights, and regulate the governor to 3-10ths, and the pressure only increased 1-10th, or scarcely that. I began with an initial pressure of one inch, and I found that by increasing the initial pressure to fully two inches, the result was that the pressure at the burner in place of being increased was diminished by almost 1-10th, or thereby, showing that the governor was almost perfect in its action, and if used, would, no doubt, be a great benefit to gas consumers in general. I do not think there need be any fear that the consumption of gas would be lessened by the use of gas-governors. On the contrary, I believe that as much gas would be used, and greater light would be afforded.

Mr. Hall (Redruth): I would like to know if it is necessary, before attaching a governor to a lamp, to take the pressure at that lamp, and adjust the gover-

nor to that pressure? I would also like to know, after the governor has been fixed and regulated, whether, if the burner should be enlarged, that would make any difference in the consumption of that particular lamp?

Mr. PEEBLES: Dr. Wallace's estimate must have been theoretical, because governors had not been introduced throughout the whole of Glasgow to give him the actual results. But had it not been that I did not wish to introduce "shop" more than was absolutely necessary, I could have brought some pamphlets and testimonials, which would have given reliable statements regarding the saving which these governors effect. I have no doubt, if Mr. Robb will test the thing himself, and if the governor works properly, he will be compelled to say that a great saving is made. In regard to Mr. Smith, I think no pipe will choke if it is well used; but apart from that, I do not see that a ¾-inch pipe, about 3 or 4 feet long, leading from one chamber to another, in such a position as I have shown, should have the slightest tendency to choke. However, even in such a case, it could easily be remedied by casing the tubes with block tin, and that surely would not choke up. I am exceedingly obliged to Mr. Hislop, who so far answered Mr. Smith's question. Of course, it will take some time before these governors can be tested by actual practice; but I have been working with a 3-inch governor for four years, and have never had the slightest hitch. We have not been working regularly with it; sometimes it would stand for a month or so idle, and then it would be put on to test its qualifications, for the satisfaction of some gas engineering friend or other, and it never failed to give excellent results. With the district governors I have had a good deal of trouble—far more so than with the station governor; but I am happy to say I have overcome the difficulties. This governor has been hanging a long time, because I did not wish to bring it forward until I was thoroughly satisfied of its action. It has only been by a great deal of hard work that the invention has been brought to its present stage. As regards the small controlling governor, Mr. Key thought there might be some risk in connexion with its working. I thoroughly appreciate this, and have, as I have shown, provided for it. I do not think this a serious objection, because a duplicate governor could be supplied, which would be attached in five minutes. As to Mr. Mitchell, I have no doubt he got all the results he spoke of; but I do not think we can use 3-10ths pressure with cannel gas of 28-candle power. I think 5-10ths is about as low as we can go. In a still atmosphere 3-10ths might give better illuminating power; but in our rooms and offices there are always slight currents of air, which are apt to cause tongues of smoke if the pressure is lower than 5-10ths. In regard to the lamps, there is no necessity for fitting each governor to the pressure of each particular lamp. The only thing that is necessary in rating these gas-governors is to know the candle power of the gas, on account of differences in the specific gravity. If you have always a surplus pressure, there is no necessity for ascertaining the pressure at each particular lamp. Of course, when your initial pressure gets below 6-10ths or 7-10ths, you cannot get the governor to come into action. You must have a surplus of 1½-10th or 2-10ths to bring the governor into action. All I mentioned about Giroud's governor was, that you can alter the burner without altering the rate of consumption; but with the ordinary lamp-governor, if you take out a burner, you must be sure that the burner with which you replace it is of the same aperture and size. I shall be glad to answer any other questions.

Mr. JAMES WHIMSTER (Perth): I may state that it is a small governor similar to this that regulates the big governor at the Perth works, and has done so for many years. It is, perhaps, not so advantageous as this where a new governor is wanted, but it can be applied to an old governor, simply by putting a tank of water on the top of that governor, and arranging it so as to have the outlet pressure opening a little valve, in order to allow water to gather and thus open and shut the cone of the large governor. It is all done with little waste under this arrangement.

Mr. PEEBLES: I am perfectly familiar with this adaptation, but then a stream of water is required. It is a beautiful arrangement, and answers its purpose admirably.

The PRESIDENT, in proposing that the thanks of the meeting be now given to Mr. Peebles for his interesting and instructive paper, thought it a pity that the valuable information it contains should be confined to the members present, and hoped that Mr. Peebles would allow it to be published in the usual way. In respect to the telegram, I think the best thanks of the Association are due to Mr. Andrew Stewart for his kindness in offering this prize. In regard to this latter subject, it was agreed that the secretary should communicate with Mr. Stewart, to whom the thanks of the Association were accorded.

(To be continued.)

LEEK GAS SUPPLY.—The Gas Committee of the Leek Improvement Commissioners have recommended an application to the Local Government Board for power to borrow £7500 for the erection of a new gasholder, &c.

SALE OF GAS SHARES AT HASTINGS.—Several shares in the Hastings Gas Company were offered for sale at the Castle Hotel, on the 18th ult., by Mr. Bridger. There was a numerous attendance, and the shares realized high prices. The first lot, consisting of two £25 paid-up old shares, sold for £86 10s. Six lots of similar shares were purchased at the following respective prices:—£88, £88, £88 10s., £90, £92, and £94 10s. Two £20 new paid-up shares realized £61. Altogether, the sale reached a total of £688 10s.

PROPOSED PURCHASE OF THE LICHFIELD GAS-WORKS.—At the meeting of the Lichfield Town Council on the 1st inst., the following correspondence in reference to the proposed transfer of the gas-works to the Corporation was read:—The first is a letter from the town-clerk to the Local Government Board.

Lichfield, July 18, 1876.

Sir,—The council direct me to present to the Local Government Board for its sanction the terms of a proposed purchase by the Corporation of this city of the lands, premises, works, and other property of the Lichfield Gas Company. The company do not possess any privileges by Act of Parliament, but were permitted more than 40 years ago to lay down their pipes in the streets, and have ever since contracted for the public lights with the council, to whom the powers of the local Acts were transferred about the same time by virtue of the Municipal Act, 5 and 6 William IV., c. 76. The property includes the plant and 24 houses adjoining. The treaty was subject to the verification of the clear profit of £950 a year, which has been ascertained. The purchase-money is £18,000, and the further sum of £2000 will be required—total, £20,000, which the council proposes to borrow. (Signed) CHAS. SIMPSON, Town-Clerk.

The reply of the Local Government Board was as under.

Local Government Board, Whitehall, S.W., July 29, 1876.

Sir,—I am directed by the Local Government Board to acknowledge the receipt of your letter of the 18th inst., with reference to the proposed purchase by the Town Council of Lichfied of the lands, premises, and works of the Lichfield Gas Company. I am to state that the Board presume that the Town Council desire to effect the purchase of the undertaking of the Lichfield Gas Company, and to supply the borough with gas, under the powers conferred by the Public Health Act, 1875. It appears, however, that the gas company have no parliamentary powers, and under these circumstances the Board consider that the Town Council could not carry out their wish of supplying the borough with gas, even though they purchase the works of the gas company, unless they obtained a Provisional Order under the Gas and Water Works Facilities Act. The Board think, therefore, that until such order has been obtained and confirmed by Parliament they could not properly sanction the proposed purchase of the undertaking of the gas company under section 162 of the Public Health Act, 1875.

In answer to a question, the town-clerk said November was the month to apply for a Provisional Order, and the Corporation would not now get the powers to take over the works until next session. A short conversation ensued, and it was resolved to forward to the directors of the gas company a copy of the letter from the Local Government Board.

CITY OF POTSDAM WATER-WORKS COMPANY, LIMITED.

The First Annual Ordinary General Meeting of Shareholders was held at the company's offices, 7, Queen Victoria Street, London, on Wednesday the 2nd inst.—FRANCIS BENNOCH, Esq., in the chair.

The SECRETARY (Mr. J. S. O'Halloran) read the following report of the directors.

In presenting their report to the first annual general meeting, the directors have pleasure in announcing that the construction of the works at Potsdam has from the beginning proceeded satisfactorily, and that the company was enabled to supply filtered water on the 1st of July, as required by the terms of the concession.

The annexed report by Mr. Green, the chief engineer, exhibits in detail the actual condition of the works at the date thereof. Although they are not yet absolutely completed, it is a matter for congratulation that so much has been done during the past year in the face of five months frost and several of the highest floods that have been known in the district for 30 years. Judging from the applications already received, and the number of houses that are being fitted with services connected with the company's mains, the directors entertain undiminished confidence in the financial success of the undertaking. It has been arranged that the formal opening ceremony shall take place on the 26th of August, by which time the directors are assured by their engineer that the contractor will have finished the whole of his work.

A balance-sheet to the 30th of June, 1876, is appended. As the company has never been publicly advertised, the board has under consideration the advisability of thus inviting applications for the balance of unallotted shares, in order to comply with the regulations of the Stock Exchange, so that should it at any time be deemed expedient to apply for a quotation on its official list, no indispensable formality will have been overlooked.

Since the last or statutory meeting, Messrs. Robert Crawford and J. H. Tolmé have resigned their seats at the board; and Mr. Stephen Walcott, C.M.G., Mr. R. J. H. Tucker, and Lord Hotham—each of whom is not only duly qualified but largely interested in the company—have been elected by the board to the direction in accordance with the Articles of Association.

Lord Hotham and Mr. W. H. Maturin, C.B., retire from the board at this meeting in comformity with the Articles of Association, and offer themselves for re-election. Mr. Herbert R. Duke, the retiring auditor, again offers his services.

The Chief Engineer (Mr. W. Henry L. Green) makes the following report on the state of the works:—

The pipe system is complete, with the exception of a short length of main in the centre of the city, and a few short side streets. The mains are being gradually charged and proved under pressure, the results being hitherto satisfactory. In some parts of the city we are already supplying water. The reservoir, which is constructed in the most solid manner, and of sufficient capacity for Potsdam 50 years hence, is complete as far as brickwork is concerned, and is already in use. The wells are being rapidly proceeded with. The one which is finished gives a good supply of excellent water; the others will shortly be in action. The stratum from which the water is taken is about 80 feet below the river, and will yield any amount of water. The pumping-station buildings are complete. The boilers have been filled and the furnaces lighted. No. 1 engine is ready, and No. 2. nearly so. The works are most substantially built, and their general appearance decidedly good. The numerous applications for connexions, even before the completion of the works, show great confidence on the part of the citizens, who are evidently very desirous to take advantage of the new water supply. The prospects of the undertaking, in a financial point of view, may, therefore, be considered as highly promising, for in a short time all the well-to-do inhabitants will doubtless connect with the mains, and the others will follow as a matter of course, while the military and other authorities have already intimated their intention of taking water for the buildings in their several departments.

Balance-Sheet, to June 30, 1876.

Dr.				*Cr.*		
Capital account—				Concession—paid in share warrants to the concessionaire	£5,000	0 0
1502 shares of £20 each, which have been paid up in full	£30,040	0	0	Concession expenses (inclusive of £750 caution money, and £480 deposit to be returned)	2,325	1 6
883 shares of £20 each, on which £16 per share has been paid	14,128	0	0	Construction of works	70,605	14 6
100 shares of £20 each, on which £12 per share has been paid	1,200	0	0	Sundry expenditure—		
2485				Miscellaneous expenses	48	0 9
607 share warrants of £20 each	12,140	0	0	Office furniture (London)	23	15 1
3092 shares of £20 each, on which has been paid	£57,508	0	0	Ditto, &c. (Potsdam)	114	8 4
Amount retained from payments to contractor in respect of interest payable to shareholders during the construction of the works	6,749	17	1	Foundation stone expenses	84	0 1
Interest—				Travelling expenses	54	9 7
Received from bankers on deposit account	17	14	11	Salaries	400	0 0
Interest on calls in arrear	11	18	3	Directors remuneration	1,108	6 8
Interest on caution money	8	8	9	Law charges	70	11 1
Sundry creditors (including contractor, £7,817 2s. 11d.)	9,812	7	10	Printing and stationery	181	19 8
Debentures—120 of £100 each	12,000	0	0	Rent of London offices	73	1 4
				Advertising	12	16 9
				Interest on debentures	360	0 0
				Potsdam working expenses—		
				Fuel, &c.	123	7 10
				Cash balances—		
				With bankers on "deposit" account	2,000	0 0
				With bankers on current account	3,529	18 11
				With secretary (petty cash)	1	14 9
	£86,108	6	10		£86,108	6 10

The CHAIRMAN, in moving the adoption of the report, said he desired primarily to allude to the fact that little more than twelve months ago the foundation-stone of the Potsdam Water-Works was laid, and those who were present on that occasion would remember the peculiar position of that most important district of the German Empire with regard to the supply of pure water to the inhabitants. The ceremony to which he alluded was attended by some of the most distinguished residents in the locality, and by the representatives of foreign governments, amongst whom he might mention Lord Odo Russell, who had manifested a deep interest in the scheme for furnishing the place with an abundant water supply. Subsequently various members of the Imperial family, on their return from Switzerland and elsewhere, visited the works, and expressed their admiration and delight that persons had been found to come across the seas and do that for the inhabitants of Potsdam which they ought properly to do for themselves. Amongst these august visitors His Imperial Majesty himself took occasion, on his return from Emms, the very morning after his arrival, to examine the works, and call for the plans; and, as the directors were duly informed, he expressed his admiration and confidence in the undertaking, and trusted it would redound to the benefit of his people. Such sentiments it was, of course, very gratifying to the board to receive, and, from the highest to the lowest, there had been constantly strong anxiety manifested that the works should be prosecuted and completed within the allotted time—viz., twelve months from the laying of the foundation-stone. His own opinion was that very soon it would be resolved by the domestics in Potsdam that they will no longer, like beasts of burden, undergo the labour of fetching water from the river, and that they will not enter the service of any employer who has not an abundant supply laid on to his house. When the works were completed Potsdam would enter upon a new phase of life, greatly to the advantage of the residents generally, and certainly greatly to the comfort of the domestic slaves, who had hitherto had to bring all the water for household use from the wells and canals in the neighbourhood. The company had, in fact, been supplying water from the 1st of July according to their contract, although, as mentioned in the report, the official opening of the works would not take place until the 26th inst., and indeed that event, for official and other reasons, might even be postponed for another week. The directors, however, were assured that by the 26th inst. all houses in Potsdam, in which pipes were laid down, might and would have as much water as they liked to consume, which would prove an

inestimable blessing. With regard to the accounts, it was not necessary to say much. The number of shareholders was not large, but the amount of their individual holdings was considerable. He thought that in these times when it was a matter of difficulty to get undertakings floated, it was a subject for congratulation, that through private influence and "pluck," the amount of money in this company had been subscribed without the slightest appeal to the public, except through the instrumentality of those who themselves were interested in the work. Indeed, it was somewhat startling to find from the accounts, that at the end of last year upwards of £23,000 had been raised, and that during the first six months of this year the cash received had increased so as to make a total subscribed of £57,508. He apprehended that there was no company at that moment in the City of London which could show such a balance-sheet as this; and when he mentioned that at the time the balance-sheet was made up every claim upon the company had been paid and settled, and that, beyond this, they had at the bank a balance of £5522 ready for any contingency that might arise, he thought he might confidently offer his congratulations to the shareholders on the position of their undertaking.

Lord HOTHAM seconded the motion, and, as a large shareholder and a director, expressed his entire confidence in the concern.

Mr. KARUTH, the concessionaire, gave some interesting details in reference to the interest manifested by the German Emperor in the undertaking, as to the necessity of an abundant and pure water supply at Potsdam, and as to the probable requirements of the public and other large establishments.

Mr. HARRINGTON said he should be sorry to cast any reflections upon the past management of the company, and, indeed, from what he had heard that day he thought great credit was due to the directors and to the contractor by whom the works had been carried out. But there were two points in the report to which he should like to refer. The first was the question of the issue of the unallotted shares. That was a matter which should be well weighed by the directors before a decision was come to. If more capital should be required for the extension of the works, he thought it could be raised with greater facility by the issue of debentures. Against such a proposition it might be urged that it was desirable to get a quotation on the Stock Exchange. He was not unaware of the importance of doing so; but he questioned whether it would not be better to raise money by debentures, rather than imperil the ultimate chance of completing the works in the same satisfactory manner as heretofore. He took it for granted that others, like himself, had taken shares in the company as an investment and not as a speculation; and, therefore, a quotation was not the first desideratum, and he believed they would not regard it as of chief importance to get a market value for their holdings at the present moment. If the directors considered that it would strengthen their hands, he should be prepared, after the adoption of the report, to move a resolution, referring this question to them for consideration, and he knew that several proprietors would support him in such a course. At the same time, he wished it should be understood most distinctly that he and the friends he represented, who were large holders of stock, had not the slightest feeling of dissatisfaction with the management of the company. The other matter to which he would refer was the number of directors on the board. During the construction of the works a large amount of labour, no doubt, fell upon the direction; but those works being now complete, it was very desirable, with a view to curtail expenses, that the number should be reduced.

Mr. FRICKENHAUS referred to the item in account of £84 for foundation-stone expenses, and expressed the hope that a wise economy would be observed in the arrangements for the opening ceremony. He thought the feeling of the meeting would be that the official deputation would not suffer by being restricted as to numbers.

The CHAIRMAN concurred in the opinion that every possible economy should be observed, and said it was a subject which would not be lost sight of by the directors. The constitution of the board, so far as the number of directors was concerned, rested with the shareholders; and, as to the first and most important point referred to, the issue of the balance of unallotted shares, or the raising of any additional capital by debentures, this was a matter which would undoubtedly occupy the anxious consideration of the board. They had consulted their solicitor upon it, and he had advised that it might be necessary to take counsel's opinion thereon. He (the chairman) believed there was nothing in the Articles of Association which would stand in the way of the course suggested, if it were thought to be for the benefit of the company; and for himself he agreed with Mr. Harrington in thinking that, in the present condition of public feeling with regard to joint-stock enterprise, it might be well to do so.

The motion was put and carried unanimously.

On the motion for the re-election of the retiring directors,

Mr. HARRINGTON moved—"That the number of directors be reduced from 7 to 6."

Mr. GRIFFIN seconded the motion.

The CHAIRMAN said it was thought that it might hereafter become desirable to have a German director. He presumed that, if this motion was carried, it would only apply to the English members, and would not stand in the way of the appointment of a resident director, if an efficient person could be found.

The motion—"That the number of directors resident in England be reduced from 7 to 6"—was then put and carried.

Mr. MATURIN said, as there was now only one vacancy at the board to be filled up, he would withdraw from being a candidate for re-election on the present occasion.

Lord HOTHAM was then re-elected, and returned thanks for the compliment thus paid him.

On the motion of Mr. KARUTH, seconded by Mr. SILBERBERG, the retiring auditor, Mr. Duke, was re-elected, his remuneration being fixed at twenty guineas.

On the motion of Mr. HARRINGTON, seconded by Admiral M'KENZIE, a cordial vote of thanks was given to the directors for their services during the year, and to the chairman for presiding over the meeting.

The CHAIRMAN, in acknowledging the vote, said that he and his colleagues fully appreciated the handsome manner in which their services had been recognized. The shareholders might rely upon their zealous and earnest attention to the affairs of the company in the future. In the past they had been relieved of much anxiety, from the fact that they had, in the person of their contractor, and of his agent in this country, Mr. Karuth—two gentlemen fully acquainted with business, zealous in their efforts that everything should be a success, and very far-seeing in all their arrangements—so that the board had been more a court of record than a court of conduct. Now that the works were completed, the concern would require constant watching; and the directors would devote to it their best energies to make it a complete success.

REDRUTH WATER SUPPLY.—An easy method of supplementing the water supply of the town has been decided on by the Redruth Local Board. It has been ascertained that an almost unlimited supply of water can be pumped from East Trefusis mine, now abandoned; and, there being already a lift of pumps fixed in the shaft, Captain Trequay has offered to pump the water when required for £1 per day. This water, coming as it does from granite, is considered to be thoroughly pure; and, on being brought in at the level of the Devoran Railway at the west end of the town, may easily be carried through the town. This will be a boon to the inhabitants in the dry season, and pipes connecting with the main will be at once laid down.—*Engineering*.

SULPHUR IN ILLUMINATING GAS.

By M. A. VÉRIGO.

Note presented to the *Académie des Sciences*, by M. BERTHELOT.

[From the *Comptes Rendus*, April 24, 1876.]

I have determined the amount of sulphur contained in the gas supplied to Odessa after purification, and in the condition in which it is sent out for consumption. I found that 100 cubic feet of this gas contained, in November last, 2, 1·81, 1·9, 1·9, and 2·01 grammes of sulphur; in December it contained 2·2* grammes. With this latter gas I made the following experiments:—

In a room having a capacity of 10,000 cubic feet, the air of which had been completely changed before the experiment, test-papers moistened with the reagent for sulphurous acid (starch and iodate of potash) were placed at different heights, and ten gas-jets lighted. At the expiration of 10 minutes the test-papers on the upper level showed very clearly the presence of sulphurous acid; at the expiration of 15 minutes the presence of this acid was manifest at an intermediate level, and after 30 minutes had elapsed, test-papers placed almost on the floor of the room indicated sulphurous acid in the lowest layer. In this way about 40 test-papers, which were colourless at the commencement of the experiment, became tinted with a very deep blue, and in each of these papers the presence of sulphuric acid could be easily demonstrated.

I remarked that the sulphurous acid was very unequally distributed in the air of the room. Rising with the other warm products of combustion, it is found in greater quantity in the upper layers; but considerable accidental accumulations are observed in the middle and lower layers. Layers that are poor in sulphurous acid are succeeded by others very rich in it. At some points the proportions of sulphurous acid are sufficiently large to render the piquant odour of this acid perceptible to the smell.

A packet of cotton twist, about 450 grammes (about 1 lb.) in weight, which had been washed in distilled water, in order to ascertain that it did not contain the slightest trace of sulphuric acid, and then dried, but incompletely, was suspended in the same room. Ten gas-jets were lighted, and at the expiration of two or three hours the experiment was terminated. The cotton twist, which was then perfectly dry, was washed with distilled water. This water had a strongly acid reaction, which it retained after boiling; it contained in contained insignificant quantities of sulphurous acid, and its acidity was due to the presence of sulphuric acid. In determining, in several experiments, the quantities of the latter acid, I found that they varied between 0·05 and 0·1 gramme. This experiment proves that the sulphurous acid produced from the combustion of gas oxidizes very easily, under similar circumstances to those of the experiment, and deposits itself, in the state of sulphuric acid, upon surrounding objects.

I believe that the conditions above described are to be easily met with in shops for the sale of woollen articles, wearing apparel, &c. The objects exposed in these establishments possess, at least in winter, the suitable condition of humidity for allowing the quantity of sulphuric acid, when once it has been deposited upon them, to gradually increase; and this acid will not be long in producing its destructive action, which is not at first manifested by any visible phenomenon. The acid reaction which is communicated to the washing water, and which does not disappear on boiling, proves that the quantity of atmospheric ammonia was not sufficient to saturate the whole of the sulphuric acid formed.

I have thus been led to think that we ought to be able to find traces of the destructive action of sulphuric acid upon the different objects exposed in shops lighted by gas. These cases are numerous in Odessa, but I shall content myself with citing one example.

I have still in my possession the metallic portion of a lamp, having the shape of a tolerably large globe, which had been exposed in a shop well lighted by gas. This globe soon lost its brilliancy, and acquired a greenish hue. On examining it, I found that its surface was corroded, and covered with a greenish substance. On washing the globe with distilled water, I obtained a colourless solution, which was clouded by the presence of a green matter, held in suspension. The solution had an acid reaction, contained sulphuric acid, and gave on evaporation crystals of sulphate of zinc, recognized by several reactions. Analysis showed that the metallic alloy of which the globe was composed contained copper and zinc. It is easy now to understand the speedy alteration of this alloy in the atmosphere charged with the products of combustion of a gas containing 2 grammes of sulphur in 100 cubic feet.

In presenting the above note,

M. BERTHELOT called the attention of the Academy to the interest attaching to the results brought forward by M. Vérigo, adding that if it was easy to deprive illuminating gas of sulphuretted hydrogen, it was not equally so with the vapour of sulphide of carbon and other analogous volatile compounds, the separation of which, in manufacture, presented great difficulties.

GLASGOW CORPORATION GAS-WORKS.

REPORT BY THE COMMITTEE ON GAS SUPPLY TO THE TOWN COUNCIL OF GLASGOW.

The Committee beg to submit to the Town Council their Seventh ANNUAL Balance-Sheet, which embraces the twelve months from the 1st of June, 1875, to the 31st of May, 1876.

It will be seen from the revenue or working account, No. 2, that the gross revenue for the year amounts to £364,895 14 7

and the gross expenditure (including therein £16,679 8s. 4d., written off capital for depreciation) amounts to 272,903 0 11

which leaves a balance to be carried forward to profit and loss account, No. 3, of £91,992 13 8

Out of this the following sums have been provided, viz—

1. Year's annuities on stock . .	£34,472 16 4	
2. Interest on borrowed money .	26,310 0 11	
3. Sinking-fund	6,274 18 9	
		67,057 16 0

leaving a surplus on the year's transactions of £24,934 17 8

The balance at credit of last year's account was 3,801 7 0

so that there falls to be carried forward to the credit of next year's account 28,736 4 8

After advertising for tenders, your committee have concluded contracts, on favourable terms, for a large proportion of coals required during the current year. In consideration of this, and the satisfactory results of last year's working, they recommended to the Town Council that the price of gas to the public be reduced from 4s. 7d. to 4s. 2d. per 1000 cubic feet, this reduction to be retrospective, and take date from last survey.

Your committee again recommend that discounts on gas accounts be discontinued, and so place all consumers on the same footing.

It will be observed that the rates and assessments charged to the gas trust, have of late been enormously increased. This is caused by the assessor in Edinburgh having adopted a new principle of valuation, which, it is believed, has not been hitherto applied to any other gas undertaking in the kingdom. This

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* Our readers know that a gramme is equal to 15·4 grains.

subject was referred to in the Town Council's minutes of the 5th of October last, and your committee have still under consideration what steps are necessary to obtain redress from this excessive taxation.

The property in Alston Street belonging to the trust has been sold to the Caledonian Railway Company at a profit of £15,024 8s. 7d., which is placed to the credit of capital account.

The mortgage debt has been reduced during the year by £23,505.

The sinking-fund now amounts to £28,029 11s. 5d.

The quantity of gas sold or accounted-for during the year is 1,415,489,000 cubic feet, being an increase of about 5½ per cent. over the preceding year.

Works.

The Committee have to report that all the works are in a state of efficiency.

The greatest consumption last year was, in 24 hours, 9,982,000 cubic feet, while the producing power of the works was 11,220,000 cubic feet, showing a surplus producing power of 1,238,000 cubic feet.

A larger sum than usual was spent during the year in maintaining and renewing the works. This was principally owing to a large section of the retort-benches being completely renewed. In renewing the retort-benches at Dalmarnock, seven retorts were set in a bench instead of five, as heretofore. This system, although common in England, has hitherto been untried in Scotland, the opinion being that the coke from Scotch cannel would not heat more than five retorts in one oven. The change has proved highly successful, and when all the retorts are so altered, the producing power of the works will be increased about 30 per cent., with only a nominal expenditure of capital.

The renewal of service-pipes is being proceeded with, 5725 having been examined during the year.

13,328 meters have been examined and repaired during the year.

The length of new mains laid during the year is 21,208 yards.

The number of meters in use at the commencement of the year was 114,132, at the end of the year, 118,598, showing an increase of 4466.

As already reported to the Town Council, the chemical works at Dawsholm show a satisfactory result for the last year.

(Signed) JAS. BAIN, *Lord Provost, Convener.*

Glasgow, July 27, 1876.

I. *Dr.—Capital Account for the Year, from June 1, 1875, to May 31, 1876.*

To Dalmarnock station and works—					
Expenditure thereon at last balance, May 31, 1875			£182,178	13	2
Less depreciation			1,821	15	9
			£180,356	17	5
Additions during the year			2,168	10	7
				£182,525	3 0
To Townhead station and works—					
Expenditure thereon at last balance			£38,479	18	2
Less depreciation			384	15	11
			£38,095	2	3
Less value of materials disposed of			1,145	12	6
				36,949	9 9
To Tradeston station and works—					
Expenditure thereon at last balance			£86,636	12	9
Less depreciation			866	7	4
			£85,770	5	5
Additions during the year			188	18	6
				85,959	3 11
To Partick station and works—					
Expenditure thereon at last balance			£18,759	8	0
Less depreciation			187	11	10
				18,571	16 2
To Dawsholm station and works—					
Expenditure thereon at last balance			£257,343	6	3
Less depreciation			2,573	8	8
			£254,769	17	7
Additions during the year			22,387	11	9
				277,157	9 4
To Chemical works, Dawsholm—					
Expenditure thereon at last balance			£13,299	19	11
Less depreciation			665	0	0
			£12,634	19	11
Additions during the year			86	16	0
				12,721	15 11
To Workmen's dwelling-houses at Dawsholm				2,920	0 0
To Property in Old Wynd—					
Expenditure at last balance			£1,470	13	5
Less value of ground and material sold			300	18	3
				1,169	15 2
To Property in Firhill Road				389	19 3
To Pipes, and cost of laying—					
Expenditure thereon at last balance			£269,420	9	8
Less depreciation			2,694	4	1
			£266,726	5	7
Extensions during the year			8,004	11	2
				274,730	16 9
To Gas-meters—					
Expenditure thereon at last balance			£134,012	14	9
Less depreciation			8,040	15	4
			£125,971	19	5
Additions during the year			6,597	1	0
				132,569	0 5
To Offices in Virginia Street—					
Expenditure thereon at last balance			£9,469	17	0
,, during the year			38	1	0
				9,507	18 0
To Counting-house furniture—					
Expenditure thereon at last balance			£1,104	14	5
Less depreciation			110	9	5
				994	5 0
				1,036,366	17 8
Balance				29,657	19 1
				£1,066,024	16 9

Cr.—Capital Account for the Year, from June 1, 1875, to May 31, 1876.

By Annuity stock—					
Glasgow Corporation 9 per cent. gas annuities				£300,000	0 0
,, ,, ,, ,,				115,000	0 0
Loans on mortgage				627,494	0 0
Thus—Amount of borrowed capital at last balance			£650,999	0	0
Repaid during the year			23,505	0	0
			£627,494	0	0
Surplus realized on sale of properties—					
Realized on sale of property in Lancefield Street above the valuation in books			£8,506	8	2
Realized on sale of property in Alston Street			15,024	8	7
				23,530	16 9
				£1,066,024	16 9

II. *Dr.—Revenue Account.*

To Manufacture of gas—					
Gas coals, including carriage			£143,218	10	2
Purifying materials, and oil, water, and sundries at works			8,066	18	7
Salaries of engineers, superintendents, and officers at works			2,912	17	4
Workmen's wages			33,961	11	6
Repairs and maintenance of works and plant (including renewal of retorts), machines, apparatus, tools, materials, and labour	£15,607	10 7			
Less old materials sold	506	0 3			
			15,101	10	4
Carting and stabling account			6,472	6	0
				£208,833	13 10
To Distribution of gas—					
Salaries of surveyor and inspectors of meters and clerks in survey room			6,389	13	5
Repair, maintenance, and renewal of mains and service-pipes, including materials and laying, paving, and labour			7,825	11	9
Repairing, renewing, and refixing meters			9,104	15	7
Regulators for public lamps			168	9	1
Miscellaneous charges and accidental damages			978	18	3
				24,467	8 1
To Rents, rates, and taxes—					
Rents and feu duties			2,980	8	5
Rates, assessments, and taxes			11,305	18	6
				14,286	6 11
To Management—					
Salaries of treasurer, accountant, and office clerks			1,512	16	8
,, collectors and account deliverers			5,259	12	3
Stationery and printing			960	2	11
General establishment charges			1,192	1	8
Repairs of offices in Virginia Street			216	1	8
Auditor's fee for auditing accounts, 1874-75			120	0	0
				7,260	15 2
To Law and parliamentary charges—					
Law			303	7	1
Parliamentary			221	4	10
				524	11 11
Retiring allowances to old servants of the companies				850	16 8
				£256,223	12 7
To Amount transferred to capital for depreciation, viz.—					
On works and pipes			8,633	13	0
On meters			8,040	15	4
				16,679	8 4
Total expenditure				£272,903	0 11
Balance carried to profit and loss account to meet annuities and interest on borrowed capital, &c.				91,992	13 8
				£364,895	14 7

Cr.—Revenue Account.

By Gas-rents—					
Year 1875-76			£324,438	4	8
Arrears of previous years recovered over estimate			2,221	9	4
				£326,659	14 0
Residual products—					
Coke			£9,734	12	0
Ammoniacal liquor and tar			27,286	15	8
				37,021	7 8
To Waste lime, &c.				709	19 6
Rents of house properties				492	10 11
Transfer fees				12	2 6
				£364,895	14 7

III. *Dr.—Profit and Loss Account (Net Revenue).*

To Paid annuities on stock, for the year ending Whitsunday, 1876			£34,762	10	0
Less income-tax			289	13	8
				£34,472	16 4
Paid interest on mortgages, for the year ending Whitsunday, 1876			£26,144	18	8
Less income-tax			217	17	5
			£25,927	1	3
Paid interest on temporary loans, &c.			382	19	8
				26,310	0 11
Amount carried to sinking-fund, as required by 32 & 33 Vict., c. 58, s. 83 (being one per cent. on £627,494 of borrowed capital)				6,274	18 9
Balance carried to next year's account				28,736	4 8
				£95,794	0 8

Cr.—Profit and Loss Account (Net Revenue).

By Balance brought from last account (June 30, 1875)				£3,801	7 0
,, ,, revenue account, being profits				91,992	13 8
				£95,794	0 8

IV. *Dr.—Sinking-Fund Account.*

To Balance carried to next account				£28,029	11 5
				£28,029	11 5

Cr.—Sinking-Fund Account.

By Balance brought from last account				£21,293	15 8
Year's revenue on reserve-fund invested				460	17 0
Brought from profit and loss account				6,274	18 9
				£28,029	11 5

V. *Dr.—General Balance-Sheet.*

To Capital account—Balance at credit thereof				£29,657	19 1
Profit and loss account—Balance at credit thereof				28,736	4 8
Unclaimed dividends				32	15 7
Unpaid annuities				344	9 6
,, interest on mortgages				39	13 4
Deposits in security of gas rents				13,385	15 9
Suspense account				2,970	0 8
Accounts due to sundry tradesmen and others for coals, &c.				31,170	1 11
Sinking-fund				28,029	11 5
				£134,966	11 11

Cr.—General Balance-Sheet.

By Outstanding revenue assets—					
Arrears of gas-rents estimated to be recovered			£44,808	15	7
Accounts for ammoniacal liquor and tar			4,983	18	8
,, coke			850	0	8
,, waste lime			172	0	1
,, miscellaneous			1,054	9	6
				£51,869	4 6
Stocks on hand—					
Gas coals			£18,126	13	11
Lime and oxide of iron			2,010	12	3
Coke			1,482	0	0
Stock in chemical works			2,285	16	9
				23,905	2 11
Outstanding accounts for stair-fittings, &c.				1,324	13 6
Sinking-fund, invested				21,754	12 8
Balance in bank				36,112	6 0
Cash—balance in treasurer's hands					12 4
				£134,966	11 11

STOCKTON AND MIDDLESBROUGH WATER-WORKS COMPANY.

The Half-Yearly Meeting of Shareholders was held at Darlington on Thursday last—Mr. HENRY PEASE, chairman of the company, presiding.

The report, which was taken as read, was as follows:—

The accounts for the half year ending 30th of June, 1876, duly examined and certified by the auditors, have been circulated amongst the shareholders, showing an available balance of £17,476 15s. 5d. After payment of all fixed charges, dividends have been declared on the original and "A" shares at the rate of 12s. 6d. per share, and on the "B" and "D" shares at the rate of 10s. per share, payable at the National Provincial Bank of England, Darlington, on Friday, Aug. 4, 1876.

Notwithstanding the result of the company's application to Parliament last year, the ever increasing requirements of the district rendered it essential that further powers, both as to capital and supply of water, should be obtained. For this purpose, with your sanction, a bill was presented to Parliament early in the present session, and simultaneously one was lodged by the Corporations of Stockton and Middlesbrough, seeking to destroy the company and vest the powers of water supply to those places in their own control. After some weeks strongly contested investigation before the Commons committee to whom these bills were referred, that promoted by this company was rejected and the corporations left at liberty to proceed to the House of Lords. Your directors entertained no doubt that it was their duty to seek before a committee of that House the rejection of a bill seeking such unusual and, as they cannot but think, unjust powers. In that committee your directors plainly demonstrated:—

1. That when a company to supply water to the towns of Stockton and Middlesbrough was proposed, and a deputation sent seeking co-operation, the inhabitants declined all assistance.

2. That the company having been formed, and the capital obtained, have, for 24 years and under four Acts of Parliament, fully carried out the powers conferred upon it.

3. That the water supplied is of excellent quality, and at a price having scarcely a parallel in the country.

4. The company, thoroughly understanding the requirements of the district, was desirous to continue to meet these as heretofore, on obtaining sufficient parliamentary powers.

5. That the counsel for the Corporations failed to show that during the whole history of the company the district had ever suffered inconvenience, that higher than legal rates had ever been charged, but always much less, or that the transactions of the company had ever been otherwise than strictly impartial. Circumstances which need not be referred to in this report gave your directors little hope of obtaining their bill before the Commons Committee.

In appealing to a committee of the House of Lords, there was every reason to expect that the strength and justice of the company's case would have led to a decision in favour of the acknowledgment of the rights of property invested under the sanction of Parliament, and the straightforward increase of those powers for the public good; that this expectation was disappointed, no doubt took you, as it did your directors, much by surprise. The directors look upon the clause stating the terms upon which the property of the company is to be transferred to the Corporations as most inequitable and imperfect; the carrying to a conclusion of this arrangement will have the most careful attention of the directors.

The CHAIRMAN moved the adoption of the report, which was seconded by Mr. GEORGE ALLISON, and agreed to.

The CHAIRMAN, in referring to the recent contests before the Lords and Commons Committees, assured the meeting that the members of the Water-Works Parliamentary Committee, Messrs. J. H. Bowman and R. Thompson, had looked after the interests of the company with the utmost fidelity and care. He thought that, in the opposition brought against the company by the promoters of the rival Corporations Bill, feelings were raised that were to be greatly regretted; and, for his own part, he could not understand how it was that people made a personal quarrel out of such a matter. He hoped that in course of time the irritation that had been created would be got rid of. He was glad to be able to point to the fact, that some of the best and most influential men in Middlesbrough—and men who were free from popular influence or prejudice—had come forward and given evidence on behalf of the company, and the old Middlesbrough myth as to the impurity of the water supplied by the company had now vanished. He had no fear that the lapse of time would prove the correctness of the views entertained by the directors of the company as to their position and prospects. In looking back upon their labours, the company had every reason to be satisfied, although their efforts for the public good had not been sufficiently acknowledged.

Mr. HARDING moved that the meeting thank the chairman and directors for the manner in which they had defended the rights and interests of the company in the recent parliamentary contest, and requested them to continue their services in securing from the arbitrators an ample value for the company's works and business.

Mr. ALLISON seconded the motion, which was passed by acclamation, and the proceedings terminated.

IRON AND COAL TRADES OF SHEFFIELD, SOUTH YORKSHIRE, AND NORTH DERBYSHIRE.

(FROM OUR OWN CORRESPONDENT.)

As I stated last week, the leading Derbyshire and South Yorkshire foundries are again doing a steady amount of business in their respective foundry departments in gas, water, and steam pipes, as well as some few lots of cast tubbing for lining colliery shafts, in order to keep back springs of water.

The brass works are not busy, but at some of the principal establishments of that kind there is a moderate production of plumbers fittings, builders brass work, and water, gas, &c., requisites.

In the coal trade there is no change to note, nor does it appear likely that such will be the case, seeing that the market is greatly over supplied with all kinds of fuel. Prices are purely nominal, the agents and merchants being glad to get orders on any terms.

THE LANCASHIRE COAL AND IRON TRADES.

(FROM OUR OWN CORRESPONDENT.)

The gas coal trade continues very lifeless, and the acceptance of tenders is still being delayed in many cases. But whether consumers are now pursuing a wise course in holding back where they have not secured their next winter's supplies is doubtful, as it is scarcely probable that coalowners will submit to further reductions on the low prices which are now ruling, and any improvement in the market would not be long in bringing about a stiffening in prices, as stocks are by no means heavy.

THE COAL AND GENERAL TRADE OF THE NORTH OF ENGLAND.

(FROM OUR OWN CORRESPONDENT.)

The coal trade of the Tyne and North of England generally remains in a somewhat unsettled condition. There are considerable financial troubles in the Cleveland district; they are not likely to be arranged so easily as at one time it was thought they would. The result is that it is having a very depressing effect upon trade in the North of England generally, and, as the Durham collieries are largely connected with local business, they feel the existing state of things very much.

Recent quotations for best gas coals are barely maintained, and inferior kinds range from 6s. upwards. The coasting demand is moderate, and most of the business that has been entered upon is for immediate delivery. Shipping trade is dull. Coasting freights are very low, and there is an abundance of tonnage in the market. Steamers to London are realizing a freight of from about 4s. to 4s. 6d. per ton. Small sailing-ships from 1s. to 1s. 3d. more. There is a falling off in business to France, and no trade of any value to the Mediterranean.

The manufacturing trade of the North of England is extremely dull, and shipments poor.

TRADE NOTES FROM SCOTLAND.

(FROM OUR OWN CORRESPONDENT.)

The annual general meeting of the Vale of Leven Gaslight Company was held on the 28th ult., when a dividend of 10 per cent. was declared. At present there is a new tank in course of construction a short distance from the works, at Alexandria, for a gasholder capable of storing 115,000 cubic feet of gas, in order to meet the growing wants of the locality. It has been arranged to lay pipes connecting Bonhill with Jamestown and the intermediate district. No change has been announced in the price of the gas supplied by the Vale of Leven Company.

At the annual general meeting of the shareholders of the Wick Gas Company, held last week, it was resolved to reduce the price of gas from 7s. 6d. to 6s. 8d. per 1000 cubic feet.

The Invergordon Gas-Works, after having been closed for several months, during which time the old retorts have been replaced by new ones, and some other repairs made, are again in operation. The town bellman made public proclamation of the fact in characteristic phraseology, pointing the moral that paraffin oil and candles were rendered unnecessary, and that people need no longer go to bed in the dark.

The maximum dividend of 10 per cent. has been declared by the Lockerbie Gaslight Company, and the price of gas remains at 7s. 6d. per 1000 cubic feet, with a discount of 10 per cent. for prompt payment. There is a meter hire of 2s. 6d. per annum. Of course, in Lockerbie, as in many other places, there are gas consumers who think that the price of gas might well be reduced. In this particular case, however, the directors "don't see it."

A reduction in the price of gas has also been made at Dumfries, but it is the smallest, I think, that I have yet had to record. It is from 6s. to 5s. 10d. per 1000 feet, and is to take effect from the date of the last survey.

The monthly meeting of the Dundee Gas Commissioners was held on Wednesday, when it was reported by the treasurer that he had valued the works at £11,990 19s. 9d. for income-tax, which was approved of by the meeting.

The Gas Committee of the Town Council of Glasgow presented their annual report to a meeting of that body, held on Thursday last. It showed a surplus on the year's transactions of £24,934. In consideration of that handsome balance, and the satisfactory result of last year's working, the committee recommended that the price of gas should be reduced from 4s. 7d. to 4s. 2d. per 1000 cubic feet. A recommendation by the committee that the discounts given to large consumers should be discontinued, gave rise to an animated discussion, but ultimately the report was carried unanimously; a counter-motion by Baillie Collins having been withdrawn in deference to the feeling manifested by the majority of the Council. At the same meeting the joint committee on Parliamentary Bills and Magistrates reported that Mr. Marwick (Town Clerk), had received a communication from the Dean of Faculty of Procurators with regard to the Burghs (Scotland) Gas Supply Bill, expressing his opinion, after having carefully gone over the clauses of the bill as amended on recommitment, that the amendments were in all respects satisfactory, and would afford sufficient protection to the interests of the city.

At the ordinary meeting of the Dundee Water Commission, held last Friday, the subject of the disputed claims of the contractors for extras in connexion with the new water-works was incidentally brought up. The Provost stated that the matter was in the hands of a small committee, and that the committee had not given up hope of being able to effect an amicable settlement with the contractors.

There is not much prospect of there being anything like a water famine in any part of Scotland this season. The hot dry weather is past, and of late there has been a good deal of rain, so that the reservoirs are generally well filled.

The price of pig iron has been down at 56s. 6d. since last report, but on Friday forenoon there was a temporary advance to 56s. 9d. cash, at which business was done. Sellers, at the close in the afternoon, asked 56s. 7½d.

There is hardly any change to report in the condition of the coal trade. The local demand is still limited, and the shipping department is far from being busy, the cranes being only partially employed.

KILMARNOCK WATER COMPANY.—The annual meeting of shareholders was held on the 21st ult., Mr. Peter Ritchie presiding. The secretary, Mr. Robert Blackwood, read the annual report, from which it appeared that the revenue continues to increase, being this year about £180 over that of last year. The directors, finding the stock of water in North Craig Reservoir getting low, had found it necessary to limit the hours of supply. The construction of the company's new storeage reservoir is progressing favourably, and the company will be in a position to give a full supply of water to the town next summer. The balance-sheet showed an income of £2835 13s. 1d., including £2740 15s. 7d. of revenue from water-rates on rental, and £64 0s. 5d. from rates for water supplied by meter. The expenditure amounted to £667 2s. 9d., leaving a balance of £1954 13s. The directors recommended a dividend of 6½ per cent. on the ordinary and first preference stock, and 6 per cent. on the 4½ preference stock, leaving a balance of £268 5s. to be carried to reserve-fund account, and increasing the sum at present to the credit of this account to nearly £1000. The report was adopted, and the retiring office-bearers re-elected.

NEW WATER-WORKS AT OLDHAM.—On Wednesday, the 26th ult., the first sod of the Denshaw Water-Works scheme of the Oldham Corporation was cut by Mr. William Wrigley, J.P., chairman of the Oldham Water-Works Committee. The new scheme covers a total drainage area of 1450 acres. The storeage of the reservoirs to be constructed comprises the Dowry and New Bridge reservoirs, which will hold 234 million gallons of water. This quantity of water, added to the volume of the streams, and after deducting compensation water, will give about 1,250,000 gallons per day. The whole of the works contained in the parliamentary plans will, when completed, give from 1½ million to 2 million gallons supply per day. The estimated cost of the works now undertaken, including a reservoir at Copster Hill, will be about £160,000. The total cost of the works shown upon the parliamentary plans will be about £200,000. The population within the limits of supply was, in the year 1874, about 141,000 persons, and in 12 or 18 years will probably reach 200,000. The water-works of the Oldham Corporation at Piethorne, Strinesdale, &c., will yield about 4 million gallons per day, so that when the Denshaw scheme is completed the supply will reach from 5½ million to 6 million gallons a day. It will require from four to five years to complete the works now commenced, and they will be carried out by Mr. Bateman, C.E. The total number of reservoirs comprised in the scheme is four: Readycondean, the embankment of which will be 56 ft. 5 in. high, while 26 acres of land will be occupied by it; Brookgate, 65 ft. 6 in. high, and occupying 60 acres; Dowry, the embankment of which will be 76 ft. high, and which will cover about 43 acres; and New Year's Bridge, the embankment of which will be 67 ft. high, and which will require about 30 acres. The Copster Hill service reservoir will also cost £14,000 to £15,000. The district of Denshaw is situate in Saddleworth. The first sod of the new water-works was cut, as above stated, by Councillor Wrigley, to whom a silver spade, the workmanship of Messrs. Elkington, of Manchester, was presented by the Mayor of Oldham. Mr. Wrigley expressed his sense of the honour done to him, and of the importance of the work, and concluded by declaring the construction of the works commenced. A luncheon was subsequently served up in a tent prepared for the occasion.—*Rochdale Observer*.

Share List of Metropolitan Gas and Water Companies.

(Corrected by Mr. F. N. Golding, Sun Court, Cornhill, from the latest Stock Exchange Quotations.)

Number of Shares issued.	Amount per Share.	Name.	Amount paid up per Share.	Last Divd. p. Cent. p. Ann.	Latest Quotations.
	£	Gas Companies.	£ s. d	£ s. d	£
10000	20	Anglo-Romano . .	20 0 0	10 0 0	16—18
5000	20	Bahia (Limited). .	20 0 0	..	10—11
1000	20	Do., do., redeem.	20 0 0	..	23—25
1500	20	Do., 2nd pref. . .	20 0 0	7 10 0	19—21
40000	5	Bombay (Limited).	5 0 0	7 10 0	6¾—7¼
10000	5	Do., fourth issue.	4 0 0	7 0 0	1—¼ pm.
10000	20	British (Limited) .	20 0 0	10 0 0	38—40
7500	20	Cagliari (Limited).	20 0 0	5 0 0	16—18
5500001.	Sk.	*Commercial*	100 0 0	10 0 0	200—203
70000	100	Do., 7 per cent. .	..	..	..
20000	20	Continental Union.	20 0 0	6 0 0	22½—23½
10000	20	Do., new	12 10 0	6 0 0	1-2¼ pm.
10000	20	Do., preference .	20 0 0	7 0 0	26—27
5000	10	*Crystal Palace District*	10 0 0	10 0 0	20—21
5000	10	Do., preference .	10 0 0	6 0 0	13¼—14½
10000	7	Do., ordinary . .	10 0 0	7 0 0	14¼—14¾
2500	10	Do., converted .	10 0 0	10 0 0	20—21
2500	10	Do., converted .	10 0 0	7 0 0	14¼—14¾
37972801	Sk.	*Gaslight & Coke* A.	100 0 0	10 0 0	206—209
1000001.	,,	Do. B.	100 0 0	4 0 0	80—85
68101.	,,	Do. 5 per ct. pref. conv., 1st issue.	100 0 0	5 0 0	202—204
59101.	,,	Do. do., 2nd do. .	100 0 0	5 0 0	202—204
30000	10	Do. do., 3rd do. .	all	5 0 0	19¼—19¾
50000	10	Do. do., 4th do. .	4 0 0	5 0 0	6¼—6¾pm
50000	10	Do. do., 5th do. .	2 0 0	5 0 0	5½—6 pm
2000001.	Sk.	Do. C 10 p.c. pref.	100 0 0	10 0 0	225—230
3000001.	,,	Do. D do. do. .	100 0 0	10 0 0	220—225
1650001.	,,	Do. E do. do. .	100 0 0	10 0 0	220—225
300001.	,,	Do. F 5 do. do. .	100 0 0	5 0 0	110—112
600001.	,,	Do. G 7½ do. do. .	100 0 0	7 10 0	162—165
1300001	,,	Do. H	100 0 0	7 0 0	145—148
23406	10	European (Limited)	10 0 0	10 0 0	17¼-8½xd
12000	10	Do., new shares.	7 10 0	10 0 0	5½-6p.xd
35406	10	Do., new shares .	5 0 0	10 0 0	4¼-7p.xd
6200	5	Georgetown, Guiana	5 0 0	5 0 0	..
5800	10	Hong Kong (Lim.)	10 8 0	10 0 0	15—16
56000	50	*Imprl. Continental*	48 15 0	9 10 0	82—84
3783501.	Sk.	*London*	100 0 0	10 0 0	202—204
1500001.	Sk.	Do., 1st pref. . .	100 0 0	6 0 0	133—138
14450	Sk.	Do., 2nd pref. . .	100 0 0	6 0 0	..
4350	Sk.	Do., 3rd pref. . .	100 0 0	6 0 0	..
7622	25	Do., A shares . .	12 10 0	6 0 0	33—34
268051.	All	Do., Debent. stk.	100 0 0	5l. & 6l.	8—10 pm.
15000	5	Malta and Mediterranean (Limited).	5 0 0	2 0 0	2½—3
6000	5	Do., preference .	5 0 0	7 10 0	4¾—5¼
20000	5	Mauritius (Limited)	2 0 0	..	1—2
25000	20	Monte Video (Lim.)	20 0 0	8 0 0	16½—17½
8000	10	Nictheroy, Brazil (Limited)	10 0 0	3 10 0	..
30000	5	Oriental (Calcutta).	5 0 0	9 10 0	8¼—8¾
30000	5	Do., new shares .	3 0 0	9 10 0	2-2½ pm.
10000	5	Ottoman (Limited).	5 0 0	3 0 0	2¾—3½
17500	10	Pará (Limited) . .	10 0 0	7 0 0	4—5
27000	20	*Phœnix*	20 0 0	10 0 0	40—41
3600001.	100	Do., new	55 0 0	7 10 0	93—95
1440001.	Sk.	Do., capitalized .	100 0 0	5 0 0	104—109
36000	20	Rio de Janeiro (L.)	20 0 0	10 0 0	31—33
7359	5	Singapore (Limited)	5 0 0	7 10 0	5½—5¾
2000	5	Do., preference .	5 0 0	7 10 0	5¾—6½
1500	32½	Shanghai	32 10 0	12 0 0	30—32
4000	50	*South Metropolitan*	50 0 0	10 0 0	104—106
4000	12½	Do.	12 10 0	10 0 0	25½—26½
20000	12½	Do., new shares .	9 0 0	10 0 0	11½—12½ pm.
15000	10	*Surrey Consumers.*	10 0 0	10 0 0	19⅛—20½
10000	10	Do., new	8 0 0	10 0 0	8¾—9⅛pm
9000	4	Unit. Gen. Limrck.	4 0 0	2 10 0	2—2½
1500	10	*Wandsw. & Putney*	10 0 0	10 0 0	19—20
1500	10	Do.	10 0 0	7 10 0	11—12
2957	10	Do.	10 0 0	7 0 0	..
993	10	Do.	3 0 0	7 0 0	..
16000	5	*West Ham*	5 0 0	10 0 0	8—8⅛
10000	5	Do., new shares .	2 10 0	10 0 0	3—4
		Water Companies.			
12000	100	Chelsea	100 0 0	6 0 0	139—141
1800000	100	East London . . .	100 0 0	6 0 0	142—145
8000	50	Grand Junction . .	50 0 0	7 0 0	73—75
5840	25	Do., ½ shares . .	25 0 0	7 0 0	..
2160	25	Do., new ditto; max. div., 7½ p.c.	25 0 0	7 0 0	34½—35½
547960	100	Kent	100 0 0	8 0 0	175—180
970	100	Lambeth	100 0 0	6 5 0	140—143
1161	100	Do.	45 0 0	6 5 0	25-30pm
442	100	New River	100 0 0	8 0 0	170—180
4475	100	Do.	30 0 0	8 0 0	50—55
400000	100	Do., deb. sk., 4 p.c.	100 0 0	4 0 0	97—99
3036	100	Southwrk. & Vauxh.	100 0 0	4 0 0	162—165
1296	100	Do., pref. stock .	100 0 0	5 0 0	104—107
..	100	Do., D shares . .	100 0 0	4 0 0	101—103
..	..	Do.	..	4 10 0	..
..	..	Do., new ordinary	..	4 10 0	..
1600	100	Do., new ord. No. 1	40 0 0	4 10 0	103—105
12172	61	West Middlesex . .	61 0 0	6l. p.sh.	132—134

The GRAND MEDAL of MERIT at the VIENNA EXHIBITION has been AWARDED to

GWYNNE & BEALE'S PATENT IMPROVED GAS-EXHAUSTERS,

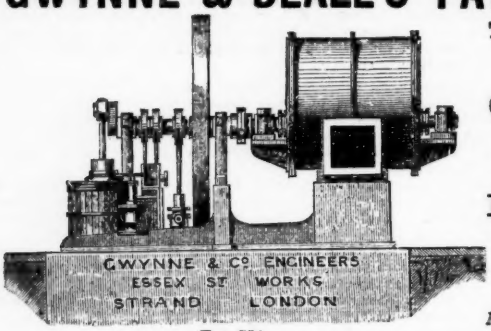


FIG. 224.

The BEST EXHAUSTERS IN THE WORLD.

GWYNNE & CO.

HAVE MADE THE

LARGEST AND MOST PERFECT

EXHAUSTING MACHINERY

Ever produced, and the most economical in working.

Prices and every information on application.

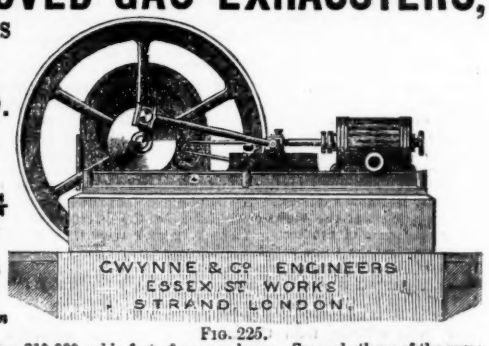


FIG. 225.

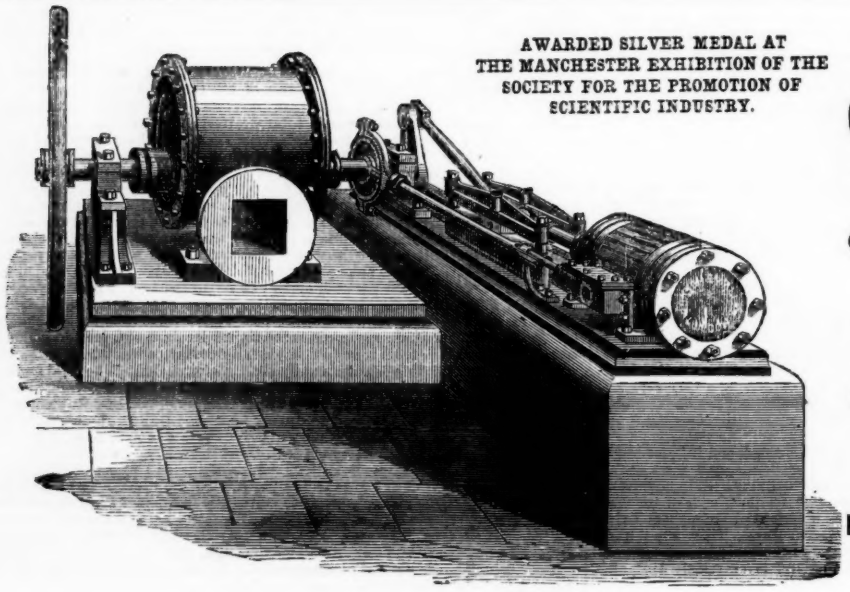
Fig. 224 represents one of those erected at the Imperial Gas-Works, Bromley, capable of passing 210,000 cubic feet of gas per hour. Several others of the same size are now on order for the same Company. These Patent Machines combine the highest quality of workmanship and materials, the largest bearings and wearing surfaces, with the **most perfect system of action yet discovered.** Fig. 225 represents one of a series of four at the Nottingham Gas-Works, each passing 52,500 cubic feet per hour. GWYNNE AND Co. *do not pretend to enter into a struggle with other makers in respect to cheapness. They have never sought to make price the chief consideration, but to produce Machinery of the very highest quality, and the most approved design and arrangement.* Their prices have been estimated with a due regard to the **excellence of the article produced,** and when this is taken into consideration, they have no fear for the result. The orders executed this season for Exhausters and alterations to their patented system amount to over 4,000,000 cubic feet of gas passed per hour, and to over 300 horse power for Engines to drive them. In every instance their work is giving the greatest satisfaction. Numerous testimonials and references can be given.

REGULATORS, BYE-PASSES, STOP-VALVES, GAS-VALVES, & MACHINERY FOR GAS MANUFACTURE, OF ALL SIZES,

CAN BE HAD ON APPLICATION TO

GWYNNE & CO., HYDRAULIC & GAS ENGINEERS, ESSEX STREET WORKS, STRAND, LONDON, W.C.

G. & Co. are now manufacturing for a London Gas Company three of their 210,000 *cubic feet Patent Gas Exhausters, and many of all sizes.*



AWARDED SILVER MEDAL AT THE MANCHESTER EXHIBITION OF THE SOCIETY FOR THE PROMOTION OF SCIENTIFIC INDUSTRY.

BEALE'S

Improved Patent

GAS-EXHAUSTERS

WITH

ENGINES COMBINED.

Sole Makers,

GEORGE WALLER & CO.

Makers of

ENGINES, EXHAUSTERS,
INDEX and DISC GAS-VALVES,
HYDRAULIC MAIN VALVES,
BYE-PASS VALVES,
TAR, LIQUOR, and other PUMPS,
SCRUBBERS and PURIFIERS,
CONDENSERS, BOILERS, &c.

PHŒNIX ENGINEERING WORKS,

HOLLAND STREET, S.E.,

AND

STROUD, GLOUCESTERSHIRE.

GASHOLDER MEN WANTED.—Apply to W. C. HOLMES AND Co., Whitestone Iron-Works, HUDDERSFIELD.

ADVANTAGES OF GAS FOR

COOKING AND HEATING.

HINTS ON GAS BURNERS, &c.

By MAGNUS OHREN, A.I.C.E., F.C.S.

Specimen Copy by post Threepence, direct from MAGNUS OHREN, Gas-Works, Lower Sydenham, London, S.E.

GAS SHARES TO BE SOLD, in a country Gas Company, incorporated by Act of Parliament. Apply to W. L. RAMSDEN, 11, Fitzwilliam Street, HUDDERSFIELD.

BRITISH ASSOCIATION OF GAS MANAGERS.

VISIT TO BECKTON, JUNE 15, 1876.

PHOTOGRAPHIC GROUPS OF MEMBERS (about 300 in each Picture), taken on the above occasion, can be had at 3s. 6d. each, post free.

Stamps or Post-Office Orders to

F. WELLS, BARKING, ESSEX.

JOHN HALL AND CO., STOURBRIDGE,

Manufacturers of FIRE-BRICKS, LUMPS, TILES,

AND EVERY DESCRIPTION OF FIRE-CLAY GOODS.

N.B.—A Stock of 15 and 16 in. CIRCULAR RETORTS always on hand. Other kinds made to order on short Notice.

GEORGE ORME & CO.,

ATLAS METER-WORKS, OLDHAM,

MANUFACTURERS OF

WET AND DRY GAS-METERS,

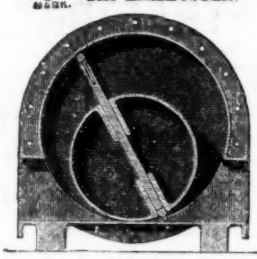
STATION-METERS, GOVERNORS,

PRESSURE AND EXHAUST REGISTERS,

LAMP-METERS IN CAST-IRON BOXES,

And every Description of Gas Apparatus.

J. BEALE'S PATENT GAS EXHAUSTER.



BEALE'S CONTINUOUSLY ACTING

GAS EXHAUSTERS

ARE NOW MANUFACTURED BY

B. DONKIN & CO.

MR. J. BEALE, of East Greenwich, having retired from business, has made an arrangement with B. DONKIN & CO. for the sole manufacture of his Patent Solid-Slide Gas Exhausters. B. D. & Co. also make Steam-Engines to drive Gas Exhausters direct or otherwise, and Gas-Valves.

Estimates and Prices on application to

B. DONKIN & CO.,

ENGINEERS & IRONFOUNDERS,

55a, BLUE ANCHOR ROAD, BERMONDSEY,

LONDON, S.E.

J. T. B. PORTER & CO.,

GAS ENGINEERS & MANUFACTURERS,

IRONFOUNDERS AND CONTRACTORS,

GOWTS BRIDGE WORKS,

LINCOLN.

ESTIMATES FOR GAS-WORKS OF ANY SIZE.

REFERENCES TO 500 WORKS ALREADY ERECTED.

N.B.—It is most particularly requested that all Communications be addressed to the **FIRM ONLY**, as circumstances have arisen which render this necessary.

WANTED, a steady, sober Man as STOKER. Constant employment. Wages 26s. per week.

Apply, with reference, to JOHN MORTON, Gas-Works, Ashford, KENT.

WANTED, an experienced, steady Man as WORKING FOREMAN. A free house provided.

Address, stating qualifications, references, and wages required, to the MANAGER, Gas-Works, WINCHESTER.

WANTED, a re-engagement as Manager, or to superintend the erection of medium-sized Gas-Works at home or abroad. Thoroughly up in every particular appertaining thereto. Aged 30. Highest testimonials.

Address No. 287, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED immediately, a situation as WORKING MANAGER of Gas-Works. Advertiser (aged 43) is able to take entire charge of a small work. Can set clay and iron retorts, lay mains and services, attend to fittings, &c. Seventeen years good testimonials.

Address R. MANCHIP, near Hazelwell Inn, West Street, Bridgewater, SOMERSET.

TO TAR DISTILLERS AND MANUFACTURING CHEMISTS.

WANTED, by the Advertiser (who will be shortly disengaged), a situation as MANAGER of a Tar and Sulphate of Ammonia Works. Thoroughly understands the manufacture and sale of the products, also grease and varnish making.

Could erect works on the most approved principles for economizing labour.

Address C., Post-Office, DEPTFORD LOWER ROAD, S.E.

WANTED, a Manager and Collector, who thoroughly and practically understands the manufacture and distribution of gas, the laying of mains and services, fixing meters, taking indices, collecting accounts, and all other duties appertaining to the office. He will be required to devote the whole of his time to his duties. Security will be required for £300. The make of gas is about 7 millions per annum.

Applications, accompanied with recent testimonials, and stating salary required, must be sent addressed to the CHAIRMAN, Dartmouth Gas, Coke, and Coal Company, Coombe, DARTMOUTH.

AN Engineer, having a thorough knowledge of the working of a Gas-Work, desires an appointment as ASSISTANT ENGINEER in a large works. Is well up in construction.

Address No. 289, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

DRAWINGS and Designs for new works, or extensions of existing works, made by a Gas Engineer of large experience in the construction of Gas-Works. Good references.

Address No. 288, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

SITUATION WANTED as experienced RETORT-SETTER. Can take Leading Man's place, or do anything in the building trade or jobbing. Testimonials and character 20 years. In last place seven years.

Address J. FINCH, 10, Athol Street, POPLAR.

A GENTLEMAN, residing in Spain, wishes to have the AGENCY of a Gas-Fitting Manufacturer, Piping, and Apparatus to produce gas on small scales. He will be glad also to obtain, on commission, concessions for lighting of towns.

Address A. B. C., care of Clayton and Co., 17, Bouverie Street, LONDON.

THE Advertiser, aged 26, requires a situation as FOREMAN or Manager in a chemical works. Seven years practical experience in the manufacture of Sulphate of Ammonia on the most improved system.

Address No. 286, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

ON SALE—One square Station-Meter, made by West in 1860, to register 8000 feet per hour, with 8-in. valves, bye-pass, &c., now in use and in good condition.

Apply to J. AND J. BRADDOCK, Globe Meter-Works, OLDHAM.

FOR SALE—Two of Cathels's improved four-way GAS-VALVES, of 6-inch bore. Have been in use for a short time, and are now taken down for extension of works.

Apply to the TOWN COMMISSIONERS, Ballinasloe, IRELAND.

GASHOLDER COLUMNS FOR SALE, cheap and good, twelve in number, about 30 ft. high, diameter near base 2 ft., near cap 1 ft. 6 in., with moulded caps and bases, guide-rails, and brackets complete, and suitable for a gasholder about 90 ft. diameter by 30 ft. deep.

Offers for same, delivered at St. Helen's Railway Station in Lancashire, to be addressed to Mr. JAMES HALL, Manager, Gas-Works, St. Helen's, LANCASHIRE.

D. BRUCE PEEBLES & CO.,

ENGINEERS,

FOUNTAINBRIDGE WORKS, EDINBURGH,

MANUFACTURERS OF WET AND DRY GAS-METERS;

Patentees and Sole Manufacturers of PEEBLES' LAMP-GOVERNORS,

ABOVE 30,000 OF WHICH ARE NOW IN USE.

"These Lamp-Governors are so superior that they are likely to supplant all others."—*Dr. Wm. Wallace, F.R.S.E., F.C.S.*

D. BRUCE PEEBLES AND CO., FOUNTAINBRIDGE WORKS, EDINBURGH.

GAS MANAGER WANTED.

THE Directors of the Cleator Moor Gas Company, Limited, will require the services of an efficient WORKING MANAGER immediately. The works have been recently erected (1872). Present consumption of gas 5 million cubic feet per annum, which is increasing. A good and commodious house provided.

Apply, stating age, salary expected, and references, to R. BAXTER, Secretary, Cleator Moor, CARNFORTH, endorsed "Manager," on or before Aug. 18, 1876, when the successful candidate will be declared.

THE Swansea Gaslight Company have for immediate SALE, the following Plant:—

A 6-h.p. Patent Trunk Engine. (Beale.)
Cylindrical Egg-ended Boiler, 20 ft. by 4 ft. 6 in. (Beale.)
Exhauster to pass 15,000 feet per hour. (Beale.)
An 8-h.p. Grasshopper Engine. (Easton and Amos.)
Cylindrical Egg-ended Boiler, 20 ft. by 4 ft. 6 in. (Easton and Amos.)
Exhauster, 20,000 ft. per hour. (Beale.)
Tar, Liquor, and Water Pumps, Eccentrics, Shafting, and Driving Pulleys.
Wrought-iron Condenser, six vertical Legs, 30 ft. high, 2½ in. by 6 in., with tar-boxes, dips, and syphons.
Wrought-iron Scrubber, 5 ft. diameter, 20 ft. high.
Cast-iron Scrubber, 3 ft. diameter, 20 ft. high.
A set of four cast-iron Purifiers, 12 ft. square by 5 ft. deep, with galvanized wrought-iron covers, lifting apparatus, four tiers of wooden sieves, 10-in. connexions and valves.

May be seen at the Gas-Works, Swansea. The whole in perfect working order; replaced by plant of larger dimensions.

Further particulars may be obtained on application to Mr. THORNTON ANDREWS, SWANSEA.

GAS APPARATUS FOR SALE.

THE St. Helen's Gas Company have for SALE the following APPARATUS, viz.:—

One Set of Vertical Condensers, consisting of 10 lengths of 14-in. pipes, 20 ft. high, with H-pipes, syphons and syphon-boxes, hydraulic valves, and bye-pass mains (12-in). All complete, and now standing as when in use.
Two 12-in. Hydraulic Valves.
Two 12-in. Bye-pass Valves.
Two Wash Vessels, 8 ft. by 3 ft. by 2½ ft. deep, with all requisite connexions.
One 9-in. Hydraulic Valve.

May be seen at the Gas-Works, St. Helen's, and all particulars relative thereto may be had on application to the Manager, Mr. JOSEPH HALL.

TO TAR DISTILLERS AND OTHERS.

THE Directors of the Brentford Gas Com- pany are prepared to receive, on or before Thursday, the 24th inst., TENDERS for the purchase of the surplus make of TAR at their Brentford and Southall stations, in accordance with the particulars to be obtained, by applying to FRANK MORRIS, Engineer to the Company, at the Works, High Street, OLD BRENTFORD.

By order.

TO MANUFACTURING CHEMISTS AND OTHERS.

THE Directors of the Brentford Gas Com- pany are prepared to receive, on or before the 24th inst., TENDERS for the purchase of AMMONIACAL LIQUOR manufactured at their Brentford and Southall Stations, in accordance with the particulars to be obtained, by applying to FRANK MORRIS, Engineer to the Company, High Street, OLD BRENTFORD.

By order.

HALIFAX CORPORATION GAS-WORKS.

TO IRONFOUNDERS.

THE Gas-Works Committee invite TENDERS for the construction and fixing at the Halifax Gas-Works of a Horizontal Screw CONDENSER.

The drawings may be seen, and copies of the specification and forms of tender obtained, on application to Mr. Wm. Carr, Manager of the Gas-Works.

Tenders, endorsed "Tender for Condenser," must be sent to me on or before Thursday, the 24th inst.

By order,
A. C. FOSTER, Town-Clerk.

Town-Hall, Halifax, Aug. 1, 1876.

ROCHDALE CORPORATION.

THE Gas Committee of the Rochdale Corporation invite TENDERS for the supply of Cast-Iron PIPES, delivered at Rochdale Railway Station, as follows, viz.:—

300 yards 18-inch main.
300 ,, 8 ,, ,,
700 ,, 7 ,, ,,
400 ,, 6 ,, ,,
300 ,, 4 ,, ,,

All to be turned and bored, and coated with Dr. Smith's process.

Particulars as to weights, and any other information required, may be obtained from Mr. Paterson, Gas-Works.

Tenders, endorsed "Gas-Mains," to be sent to me on or before Aug. 15, 1876.

By order,
ZACH. MELLOR, Town-Clerk.

Town-Hall, Rochdale, Aug. 2, 1876.

BARNET DISTRICT GAS & WATER COMPANY.

NOTICE is hereby given that the ORDINARY HALF-YEARLY GENERAL MEETING of the PROPRIETORS of the above Company will be held at the Gas-Works, Barnet, on FRIDAY, the 25th day of August inst., at Two o'clock in the afternoon precisely, to receive the Report of the Directors and the Accounts for the half year ending the 30th day of June last, to declare a Dividend, to elect an Auditor, and to transact the general business of the Company.

And NOTICE is hereby further given, that immediately after the transaction of the business of the above meeting, an Extraordinary Meeting of the Proprietors of the above Company will be held for the purpose of raising, by the creation and issue of New Ordinary Shares or Stock of the Company, a sum not exceeding in the whole £30,000, as authorized by the Barnet District Gas and Water Act, 1872.

The Transfer Books will be closed from the 11th to the 25th inst., both inclusive.

By order of the Board.
ALFRED LASS, Secretary.

Offices, 60, Cornhill, London, Aug. 4, 1876.

ALFRED WILLIAMS,

PHŒNIX FIRE-BRICK WHARF,

64, BANKSIDE, SOUTHWARK, LONDON, S.E.

GAS ENGINEER AND CONTRACTOR FOR THE ERECTION OF GAS-WORKS,
AND FOR THE
SUPPLY OF RETORTS, FIRE-BRICKS, CAST-IRON MAINS,
AND ALL MATERIALS FOR GAS MANUFACTURE AND DISTRIBUTION.

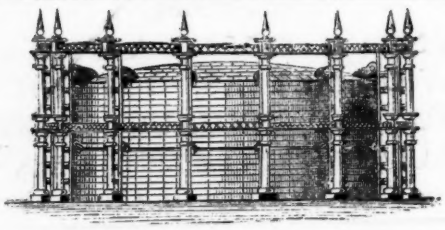
B. GIBBONS, JUN.,

DIBDALE FIRE-CLAY, BRICK, AND GAS-RETORT WORKS,
STOURBRIDGE (Established 1834),
MANUFACTURER OF EVERY DESCRIPTION OF
Burs, Lumps, Stays, Shields & other Bricks, & Gas-Retorts.
A LARGE QUANTITY OF RETORTS ALWAYS IN STOCK.

Circular .	14 in.,	15 in.,	16 in.,	18 in.
Ovals . .	17 in. × 14 in.,	17 in. × 15 in.,	20 in. × 15 in.,	21 in. × 15 in., &c.
D's. . .	14 in. × 14 in.,	15 in. × 12 in.,	15 in. × 13 in.,	17 in. × 14 in., 18 in. × 13 in.
	18 in. × 15 in.,	20 in. × 16 in.,	22 in. × 14 in.,	24 in. × 14 in., 24 in. × 15 in., &c.

Special attention given to the execution of Export Orders.

HOPE IRON WORKS,



STOCKTON ON TEES.

ASHMORE & WHILE,

GAS ENGINEERS & CONTRACTORS,

MANUFACTURERS OF GASHOLDERS,

GAS APPARATUS OF EVERY DESCRIPTION,

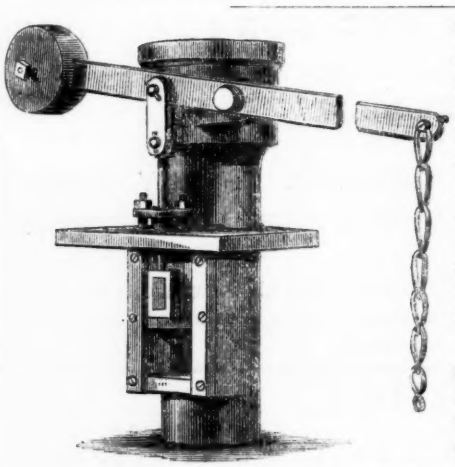
Including Improved

Retort-Lids, Boilers, Cast and Wrought Iron Tanks, Iron Roofing, Bridges, Girders,

And GENERAL IRONWORK.

N.B—Estimates for all Gas Plant and Remodelling supplied on application.

MOORE'S PATENT DIP-PIPE.



THE advantages of this Dip will be seen from the engraving. It is thoroughly effectual in its working, removing the whole of the pressure of the hydraulic main from the retort, thus causing a great saving in gas. It is very easy of manipulation, requiring little care and attention; it cannot get out of order, and, when shut, works as an ordinary Dip-Pipe. No accumulation of carbon in retort. Can be fixed to existing H-pipes.

In ordering the Dip, the distance from top side of hydraulic main to water-level should be stated; also the Dip at which it is required to work when the valve is shut.

PRICES—3-in., 35s.; 4-in., 42s.; 5-in., 48s.

SOLE AGENT: J. GILL, GAS-WORKS, BRIDGENORTH,
To whom all communications should be addressed.

MAKERS: THE COALBROOKDALE COMPANY, SHROPSHIRE.

THE THAMES BANK IRON COMPANY,

(Successors to LYNCH WHITE,)

SUPPLY FROM STOCK

CAST-IRON RETORTS, SOCKET-PIPES for GAS or WATER PURPOSES, FLANGE-PIPES for STEAM, RAIN-WATER PIPES and GUTTERS, HOT-WATER PIPES and BOILERS, and all requisite Connexions for same; also LAMP-COLUMNS, LAMPS, WROUGHT FRAMES, WROUGHT-IRON TUBING, &c., &c.

All kinds of Gas-Works Apparatus and General Castings made to Pattern or Drawing.

ADDRESS—

OLD BARGE WHARF, UPPER GROUND STREET, LONDON, S.E.

SAM. CUTLER & SONS,

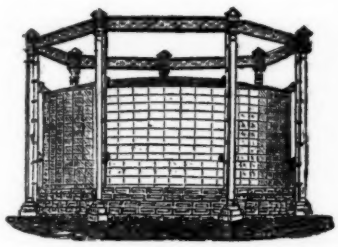
CONTRACTING GAS ENGINEERS,

GASHOLDER & GENERAL GAS APPARATUS MAKERS,

MANUFACTURERS OF

BOILERS, IRON ROOFING, IRON BRIDGES,

AND GENERAL IRONWORK.



S. C. AND SONS undertake Contracts of any magnitude for the **Erection of new and Remodelling of existing Gas-Works**, for **Gasholders, Cast and Wrought Iron Tanks, Iron Roofs**, and every description of **Apparatus** for the Manufacture and Distribution of Gas.

Special attention is invited to their **"Improved Condenser,"** which is very effective, and much approved; also to their patterns of **Annular** and other **Condensers, Scrubbers**, and **Purifiers**, of all sizes, which they arrange either with **Centre** or Ordinary **Slide Valves**.

WORKS FOR THE SUPPLY OF

VILLAGES, MANSIONS. FACTORIES, &c.

S. C. AND SONS undertake the **Supply** and **Laying** of **Mains** for **Gas and Water**, and supply all Castings, Connexions, and Fittings for Retort-House, Works generally, and for Streets. They also supply **Valves** of all descriptions, Iron and Clay Retorts, Hotpressed Retort-Lids, Steel Charging-Scoops of improved make, for which they have special machinery, Improved Coke and Coal Barrows, Cross-Bars and Screws, Bolts and Nuts, Furnace and Stoking Tools, Iron and Wood Purifier-Sieves, Lead, Yarn, Borings, &c., including every requisite whatsoever for a Gas-Work, a well-assorted stock being kept of those goods most in request.

SOLE MAKERS OF BRETT'S PATENT COKE BARROW.

Experienced Retort Setters sent to any part of the Kingdom.

Address: **PROVIDENCE IRON-WORKS, MILLWALL, LONDON.**

GEORGE NEWTON,

UNION STREET WEST, OLDHAM,

MANUFACTURER OF

SQUARE STATION-METERS, with PLANED JOINTS;

ROUND STATION-METERS, WITH CAST-IRON STANDS;

WET AND DRY CONSUMERS GAS-METERS, GOVERNORS, &c.

TO BE SOLD BY TENDER.—Pursuant to an order of the High Court of Justice, Chancery Division, made in the matter of the Companies Acts, 1862 and 1867, and in the matter of the Air Gaslight Company, Limited, with the approbation of the Vice-Chancellor Sir Charles Hall, TENDERS are invited to be sent to Mr. James Henry Thornton, of No. 15, Finsbury Place South, in the City of London, Public Accountant, the Official Liquidator of the above-named Company, on or before the 30th day of September, 1876, for the purchase of the PATENT and PATENT RIGHTS belonging to the above-named Company, for inventions made by Messrs. C. W. and A. H. Harrison, for the manufacture of Air Gas for Lighting and Heating Purposes, and of apparatus and machines for using the same, and comprising two patents granted in June, 1872, and for which the Company agreed to pay the sum of £100,000 in cash; and also seven subsequent patents for improvements to the said invention. Also for the purchase of the Foreign and Colonial Patents of the said Company for the countries of New Zealand, Tasmania, Victoria, Ceylon, Jamaica, British Guiana, Trinidad, Barbadoes, Dominica, Dutch West Indies, Canada, America (United States), Mexico, Brazil, Peru, Chili, Argentine Republic, Paraguay, Uruguay, United States of Columbia, Venezuela, Ecuador, Panama, Bolivia, Spain, Austria.

Particulars and conditions of Sale, and forms of tender, may be had gratis of JAMES HENRY THORNTON, of 15, FINSBURY PLACE SOUTH, E.C., the Official Liquidator; or of RICHARD HEWLETT, 56, ESSEX STREET, STRAND, W.C., Solicitor.

The Official Liquidator does not bind himself to accept the highest or any tender.

WILLIAM BINNS SMITH, Chief Clerk.

PATRONIZED BY THE ROYAL ARSENAL, WOOLWICH.

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By a simple process the Foul Lime is converted into Fuel, by the combustion of which the lime is reproduced as a purifying agent.

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The adoption of the above invention, without a licence from the Patentee, will be an infringement of the patent, and will subject the person or company guilty of such infringement to legal process.

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Is prepared to open the Books, and, if necessary, keep the Accounts of Gas and Water Companies.

To examine the Books and Accounts, and prepare Balance-Sheets for the information of Directors.

To assist Secretaries in preparing Balance-Sheets, according to the "Gas-Works Clauses Act, 1871;" or may be consulted with respect to Accounts generally.

TO INVENTORS AND PATENTEES.

MR. W. H. BENNETT, having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their invention may be secured for Six Months; or LETTERS PATENT, which are granted for Fourteen Years.

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Inventor of the

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GAS AND HOT WATER ENGINEER,

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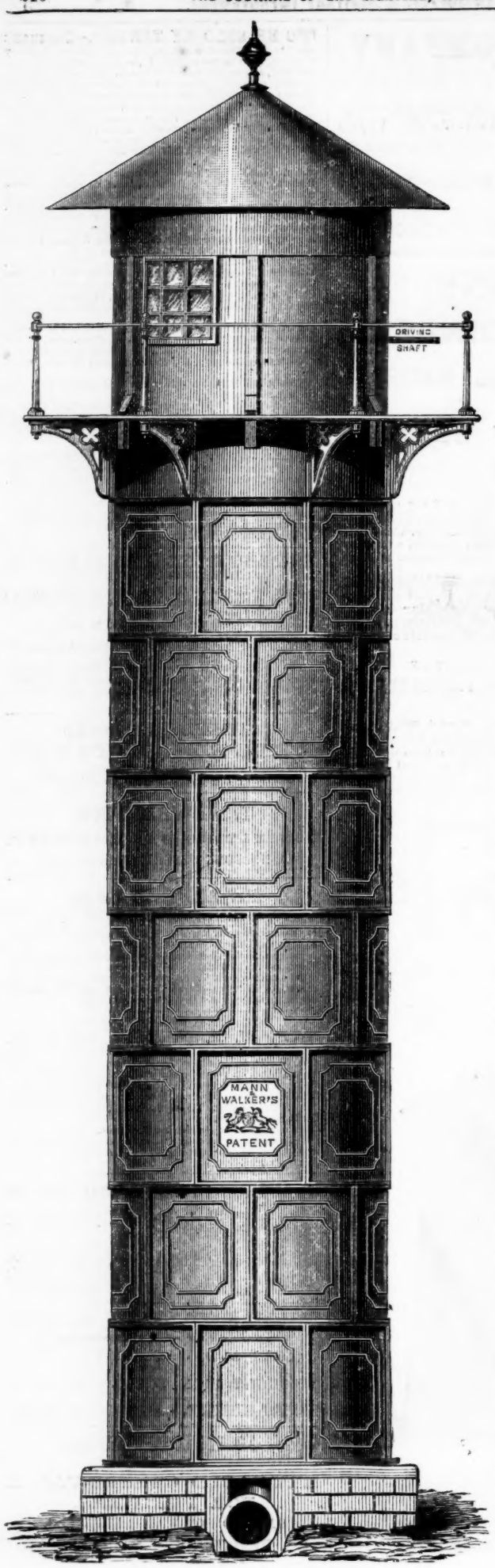

C. & W. WALKER,
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MANN & WALKERS' PATENT SCRUBBER.

By Letters Patent in Great Britain, Europe, and the United States of America.

By some important improvements recently patented, the purifying power of these Scrubbers has been much increased, and a stronger ammoniacal solution obtained, which is found to absorb a large portion of the carbonic acid contained in gas, effecting an important saving in money and labour in the lime purifiers, and where oxide only is used, the increase in the illuminating power of the gas obtained by these Scrubbers is shown in a remarkable degree, in consequence of the large quantity of carbonic acid removed from the gas.

It is to be particularly noted that the im-portant results of these Scrubbers do not depend upon the machinery alone. The entire internal construction of the Scrubber bears an almost equally important part. For this reason, where it is desirable to convert existing Scrubbers, whose dimensions happen to be suitable, the work commences by ripping out the whole of the interior of the shell, and beginning the internal construction *de novo* from bottom to top.

They are, in all cases, constructed under guarantees to perfectly perform their work. They are now extensively used in the largest gas-works of London and the chief cities of Europe, the number in use exceeds **one hundred,** and their perfect efficiency and profit to a gas company have been fully established with every variety of coal used in Europe. References can be given to the largest gas-works in Europe.

By their use the department of purification from ammonia upon a gas-works is made complete, without the aid of prepared oxide of iron, chemicals in purifiers, or any other supplementary process, and the whole ammoniacal residual product contained in the coal is absorbed and obtained in the form most profitable to a gas company, while the requirements of all Acts of Parliament and of the Board of Trade, relating to incorporate gas companies, are satisfied.

Foul Gas, properly condensed, entering the inlet is, by once only passing through the Scrubber, completely purified from ammonia with regular certainty day by day, without any further trouble, or any other process, effected by a very small quantity of clear water let into the machinery room at the top of the Scrubber, which is discharged at the liquor outlet at the bottom, from Newcastle coal at about 18 to 20 ounces strength, from Yorkshire and other coals, generally from 25 to 30 ounces strength; while acidulated litmus or turmeric exposed at the Scrubber outlet will not show the slightest discoloration, and there is not a quarter of a grain of ammonia per 100 feet left unabsorbed.

They contain their own engine power, re-quiring only a small inappreciable quantity of steam from the gas-works boiler, and are then complete in themselves, ready for service.

Applications relating to dimensions and prices should be addressed to us. C. AND W. WALKER, 8, FINSBURY CIRCUS, LONDON, E.C., or to Mr. WILLIAM MANN, late Superintendent of the Chartered Gas-Works, BLACKFRIARS, LONDON; they should state approximately the largest make of gas in 24 hours on a winter's day, and the smallest make on a summer's day, to be purified.

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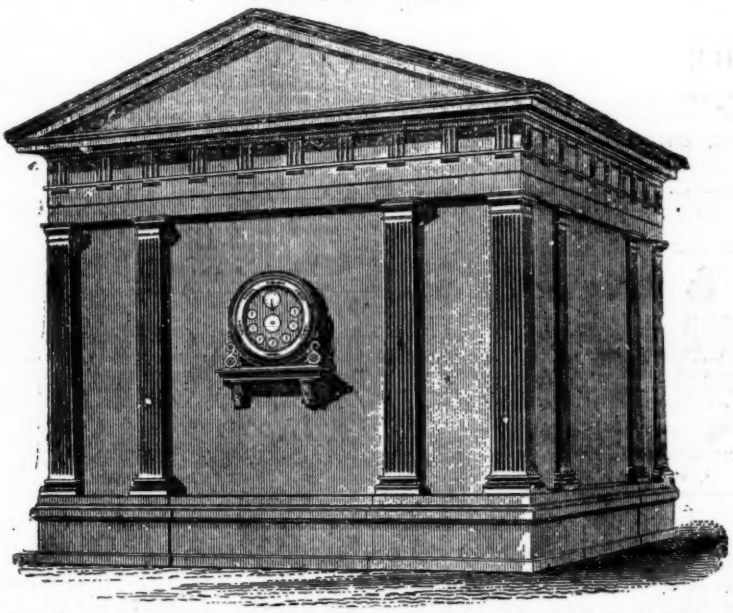

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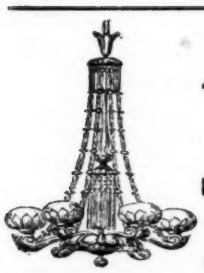

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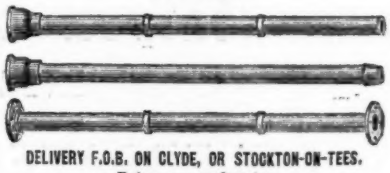

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This Cannel produces in actual working, in iron retorts, 9200 cubic feet of 32-candle gas, and upwards of 11 cwt. of coke, and in clay retorts will produce 11,500 cubic feet of 25·9-candle gas.
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Silkstone Nuts	10·800	15·85	12·66 cwt.....	6·0	0·69

NOTE.—The illuminating power of the gas was tested by the standard burner now used in London by the Gas Referees, under the City of London Gas Act, 1868.

Horseferry Road, Westminster, March, 1870. (Signed) F. J. EVANS.

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Purified gas per ton of coal in cubic feet (average)	10,775
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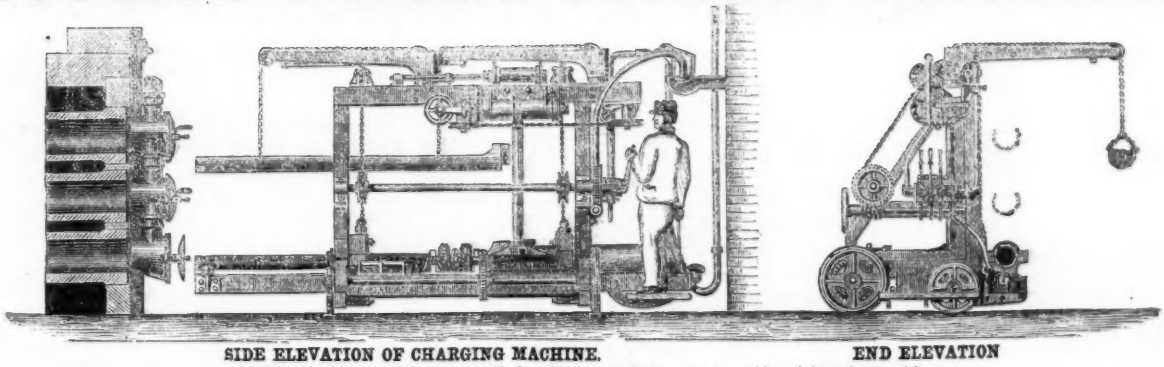

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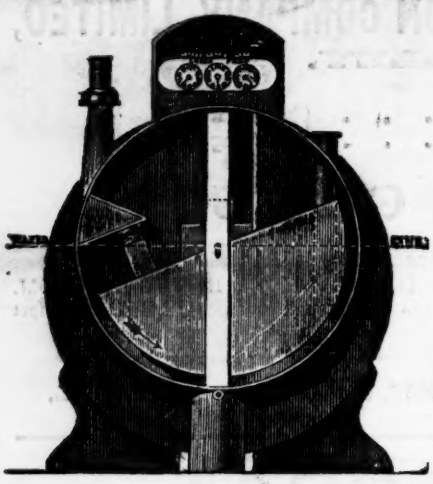

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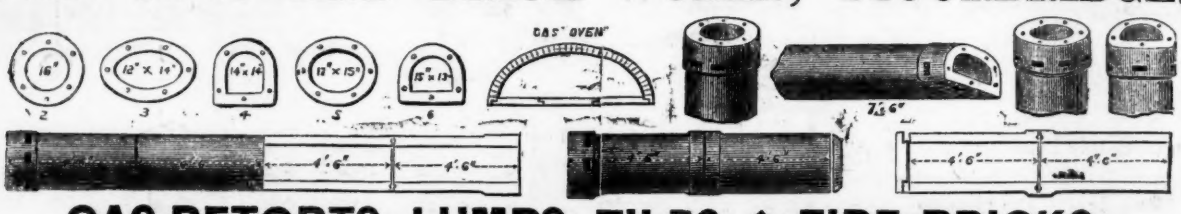

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